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fly the Seven Seas

A fleet of Consolidated PB2Y Coronados is now helping the Naval Air Transport Service to deliver tons of supplies daily to Australia, Alaska, England and Africa.

Large fleets of long-range land planes and flying boats are also joining the Service, bearing such famous names as Consolidated, Curtiss-Wright and Douglas. All these, like the Coronados, are being powered by dependable Pratt & Whitney engines.

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This great need is your opportunity . . . for there is a place for YOU in American aviation! Whether you enter the Army or Navy Air Forces, the Civil Air Patrol or the Civilian Pilot Training Program . . . you will help your country. And, at the same time, you will develop skills that assure your success in the mighty air age of the future.

Prepare to take your place in American aviation! Learn to fly now! It's easy . . . especially in the famous Piper Cub Trainer.

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FREE BOOKLET ON HOW TO FLY. Send today for your copy of the easy-to-understand booklet "You, Too, Can Fly!" If you also want the full-color Piper catalog, enclose 10c in stamps or coin for postage-handling. Piper Aircraft Corporation, Department SF122, Lock Haven, Penna., U.S.A.

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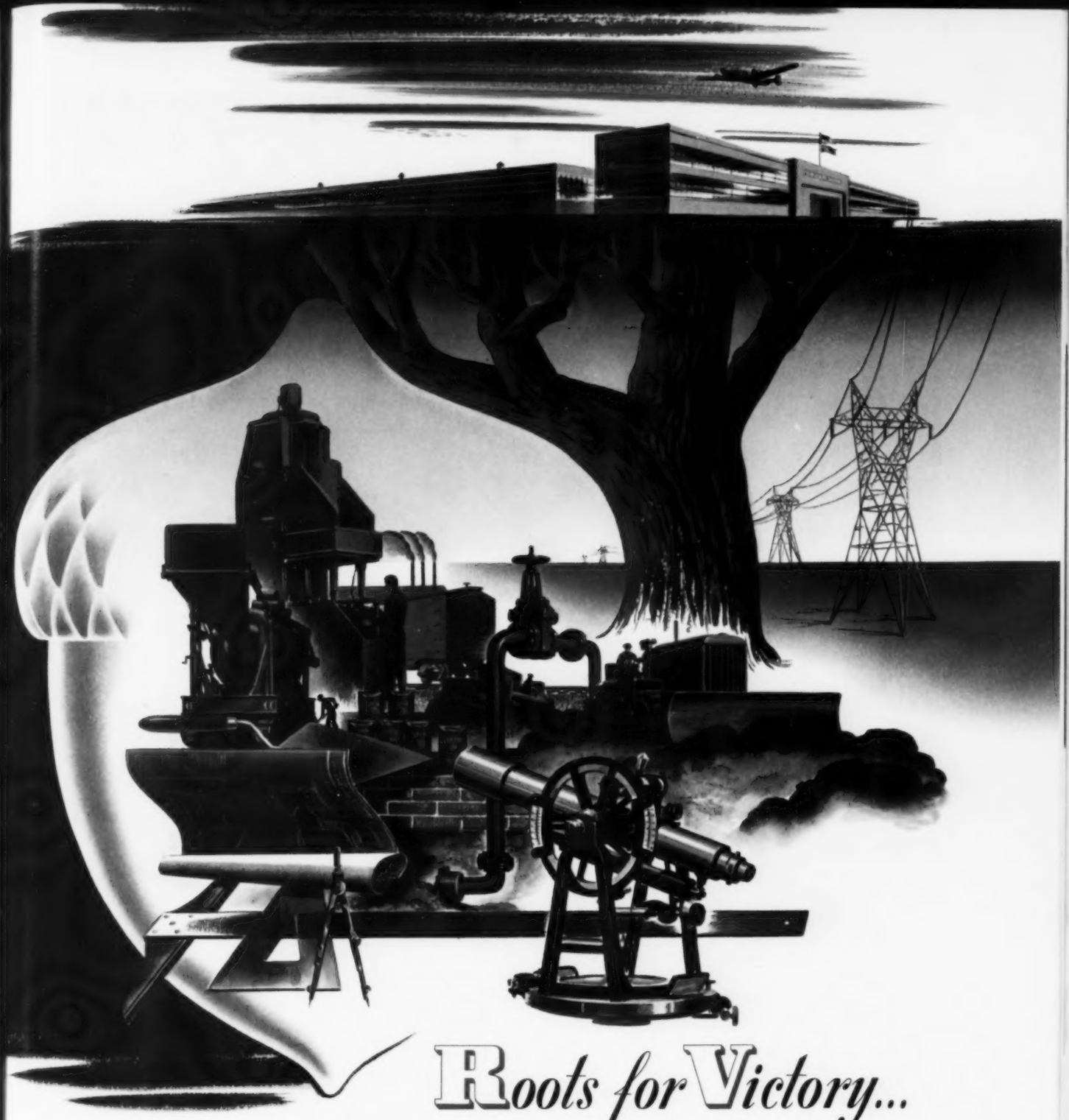
POINTS THE WAY TO WINGS FOR ALL AMERICA



Roots for Victory...

Like the Harvest, America's production is the fruit of many labors. To those who have helped so greatly in the past year — the planners, the builders, the workers . . . the men in many fields of activity whose efforts have speeded our program—Wright extends its appreciation for accomplishment.

WRIGHT *Aircraft Engines*

POWER THE TONNAGE OF THE AIR

A. T. C. 220

AMERICA'S ONLY RADIAL AIR-COOLED

DIESEL ENGINE

Ten years ago the first Guiberson-powered plane took to the air and the first ATC certificate for the Guiberson radial diesel engine was granted. Today, it is the only engine of its kind in the nation. It provides dependable, low-cost, fire-safe power, not only in planes but also in tanks which are on the fighting front. And in the field of post-war transportation it will win leadership for America—in the air, on land and on the sea.

America's top aircraft manufacturers rely on GUIBERSON for precision-built cowling, exhaust manifolds, intake manifolds, baffles and other vital parts

Guiberson, U.S.A.

GUIBERSON DIESEL ENGINE COMPANY

GUIBERSON CORPORATION
AIRCRAFT AND HEATER DIVISION
Dallas, Texas

Southern Flight

The only complete monthly digest of aeronautics in the South and Southwest

DECEMBER, 1942 VOL. XVIII, NO. 6

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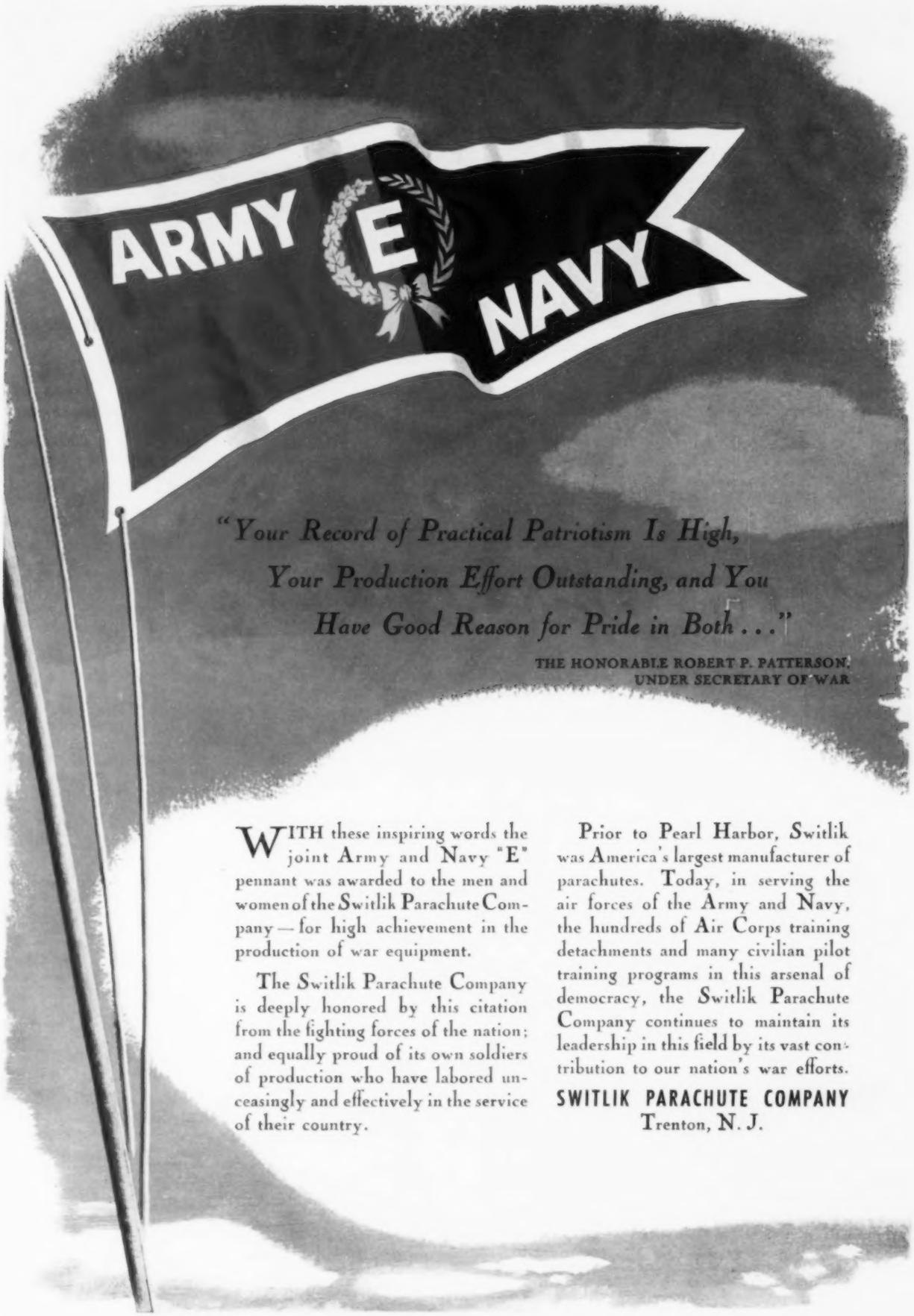


"Your Record of Practical Patriotism Is High, Your Production Effort Outstanding, and You Have Good Reason for Pride in Both . . ."

THE HONORABLE ROBERT P. PATTERSON,
UNDER SECRETARY OF WAR

WITH these inspiring words the joint Army and Navy "E" pennant was awarded to the men and women of the Switlik Parachute Company — for high achievement in the production of war equipment.

The Switlik Parachute Company is deeply honored by this citation from the fighting forces of the nation; and equally proud of its own soldiers of production who have labored unceasingly and effectively in the service of their country.

Prior to Pearl Harbor, Switlik was America's largest manufacturer of parachutes. Today, in serving the air forces of the Army and Navy, the hundreds of Air Corps training detachments and many civilian pilot training programs in this arsenal of democracy, the Switlik Parachute Company continues to maintain its leadership in this field by its vast contribution to our nation's war efforts.

SWITLIK PARACHUTE COMPANY
Trenton, N. J.

REVVING UP ★ ★ ★

TRUTH IN TEXAS: Those who haven't yet wangled a commission to fight for the Four Freedoms should be extra cautious about soliciting recommendations from Texans. Some of the boys have had enough of the pass-the-adoration gag. A certain officers procurement division headquarters recently received the following letter from a Texas citizen on behalf of a judge turned volunteer:

"Gentlemen:

"The writer has been requested to recommend for consideration the Honorable ....., County Judge of ..... County, who seeks a commission in the United States Army. Since he is a personal friend of mine, I am forced to do this, although I do not know of any way whatever that he would be of any assistance to the Army, and, in fact, I believe he would be a hindrance.

"The old gentleman was a pretty good old guy in his day, but he has approached the age of senility, in addition to which he is probably the laziest man in West Texas. Although he is a veteran of the Spanish War, he still has ideas about his prowess, and is continually chasing blondes. He drinks a case of Budweiser every day, and his wife has to put him to bed every night. The least said about his honesty and ability is too much. If the Army can find any use for this old b-----d, they are welcome to him, as we will certainly be glad to get rid of him."

★ ★ ★

SAFETY FROM SODA POP GAS: **We never cease to marvel at the ingenuity of aviation. Among the hundreds of miracle-working gadgets which make airplanes tick is the versatile little Walter Kidde bottle of carbon dioxide gas, which does much more than extinguish fire. The latest adaptation provides a midget power plant for emergency operations in activating faulty landing gear, bomb bay doors and brakes.**

★ ★ ★

FOR FRANKLIN D. AND VICTOREE: When President Roosevelt toured the war factories recently, his itinerary included New Orleans, where he visited Andrew Jackson Higgins (see page twenty-four).

The President also heard a rendition of the "Higgins' Victory March," with words and music by a Higgins' worker. Here are the words:

"Stout-hearted men of the sea,
We'll stand by our Franklin D.
Into this fight we will give our lives
For the Stars and Stripes of our Democracy.

"Stout-hearted men of the sea,
"The Higgins ships will bring you victory,
So let's all work and fight for Liberty
With Andrew Higgins and Franklin D."

★ ★ ★

DIVE BOMBER DEVOTION: Next to Al Williams, most ardent backer of dive bombing we've encountered is Lieutenant C. E. Dickinson, a Navy pilot who dumped a 500-pounder spang in the vitals of the Jap carrier Kaga, off Midway. "High-level bombers may be shooting down Focke-Wulfs and Zeros in droves," says Dickinson, "but when it comes to sinking ships at sea they'll never equal the record of the dive bombers."

PACIFIC PANORAMA: **Lieutenant Dickinson won the Navy Cross with two gold stars—the equivalent of three Crosses — and an Air Medal for action at Pearl Harbor, in the Marshall Islands and during the Battle of Midway. His recent articles in the "Saturday Evening Post" were the most vivid account of modern sea warfare yet to come out of the conflict, and his book, "The Flying Guns", is expected to be a best-seller. We met him the other night in Dallas and picked up a few of his observations for the record. . . . Navy pilots were at first awe-struck to find little yellow-painted put-putts flitting about at sea, thousands of miles from nowhere, but quickly recognized them as being the much-discussed "suicide" reconnaissance planes carried by Jap submarines . . . If the Japs have any four-motored bombers, they haven't used them at sea, but Dickinson has seen numerous four-motored Jap patrol planes. . . . Nipponese fighter pilots lack air discipline, but in bombers they hold formation at all costs. . . . Donald Douglas' "Dauntless" dive bombers have no peer, except for the new Douglas model. One of the current types came through an engagement despite five cannon holes in the main spar. . . . The Japs have literally hundreds of super air bases scattered over Pacific islands.**

★ ★ ★

SNORTER OF SORTS: Are you a member of the Short-Snorters, that "ancient" though fast-growing organization of American flying men? If not, and you have any connection with United States aviation you had better try to join quietly or the chances are you will be publicly, and perhaps expensively, initiated the next time you get together with some of the boys.

As an old Snort-Snorter ourself, we don't intend to reveal all of the secrets of the order, but suffice it to say that an overwhelming percentage of American aviation leaders, both military and industrial, an ever-growing number of celebrities of all types, and countless lesser folk, such as Air Force officers, airline and aircraft company employees and aviation writers are paid-up members. And we mean paid up.

Initiation ceremonies are simple. All that is needed is a quorum of Short-Snorters present to decide that a prospective member is eligible and

(Continued on page 12)

AVIATION WRITERS last month honored Colonel Art Ennis, assistant for Air Forces to the Army's director of public relations, as "the man who had done most to aid the aviation writer in disseminating information concerning military aircraft and aviation during 1942." In the photo, left to right, are: Seated, Captain W. H. Graham, Maj. Dick Kirschbaum, Lt. Col. J. S. Edgerton, Col. Ennis, Maj. Niel Silsbee, Lt. T. Benson Hoy, Capt. Ken Hoyt, and Lt. A. E. Talbert. Standing—Wayne Parrish, Robert Wood, Sandor Klein, AWA President Sloan Taylor, Leon Schloss, Fred Neely and Philip Andrews.

The Birdmen's Perch

MERRY XMAS!
from Flutter and Major Al Williams

alias, "Tattered Wing Tips," Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.

BLASTER OF PARIS

The pilot of a Liberator described American bombers in one succinct sentence when he returned to his base from a successful mission. He had brought his plane home on two engines, control cables shot away, holes in the wings, tail, and fuselage, and with half of his crew unconscious.

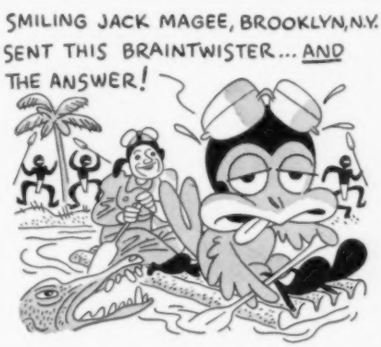
"You can shoot 'em to pieces," the youngster said, "but the pieces stay together and keep flying!"

We like that description and with a word or two changed, it tells the story of Gulfpride Oil. The exclusive Alchlor Process, by which Gulfpride is refined, removes to the *highest degree* all the undesirable and most readily oxidized compounds in the oil. So Gulfpride resists decomposition, carbon formation, gum-and-sludge formation *longer* because it's *tougher*.

You can beat it to pieces, but the pieces stay together and keep lubricating!

THE GRIPES OF RAFT-TRAVEL

Lost in New Guinea, two fliers are being guided to their base by 3 natives. The fliers decide not to separate, because of the ferocity of the natives. Yet, a stream must be crossed on a raft that holds but



two passengers. How can the crossing be arranged without separating the fliers? There are two answers, and you can have them both for the asking.

TRIPLE-WHOPPER DEPT.

Guess we'll never stop being amazed at the power in a molecule of Gulf Aviation Gasoline. Cpl. Henry Hay, a radio operator in the 113th Obs. Sqdn., tells us he was having trouble with the receiver in his plane until he cleaned the antenna lead-ins with G.A.G. . . . and promptly "pulled in" Australia!

And before we'd recovered from that, we heard from Arthur Stovall, the "Ailing Aileron" of Hangar #8, at Love Field in Dallas. A friend of his built a plane powered with a two-cylinder washing-machine motor. Gassing up with G.A.G., this bucko whipped upstairs and chased P-38's out of the sky for 3 hours!

The topper was a letter from Wanda Grabczak of Detroit. Almost out of gas and far from home, she remembered that gas expands in the afternoon. She drained

the Gulf Aviation Gasoline from her plane's tanks into a can, waited until afternoon, and sure enough . . . there was 20% more fuel in the can. After five afternoons, she had enough G.A.G. to return home!

We think each one of these mythteries deserves a Whopper Diploma. And for the first time in the history of the Perch, Ladies and Gentlemen, we're sending out 3 Diplomas in one month!

Gulf Oil Corporation and Gulf Refining Company... makers of

GULF
GULF AVIATION PRODUCTS

OIL IS AMMUNITION—USE IT WISELY!

IF YOU'VE HAD TO STORE YOUR PLANE – AND THE ENGINE HAS STEEL VALVE GUIDES – BE SURE...
... AND ARRANGE TO HAVE THE PROP ROTATED SEVERAL TIMES EACH WEEK. THIS WILL PREVENT...
...THE VALVE STEMS AND GUIDES FROM RUSTING AND SEIZING.. IF YOU'RE FLYING YOUR PLANE,
ROTATE THE PROP WITH THAT GOOD GULF AVIATION GASOLINE!
GULF

All's Well!

Because He Lands Well On AEROLS*

★ The pilot of this dive bomber is back from the furious fighting of a mission successfully completed. Now, as he prepares to land on the carrier's deck, confidence replaces tension. He knows he will make a perfect landing—*for his plane is equipped with Aerols!*

He is only one of many thousands of pilots who rely on Aerols. For Aerols keep 'em landing safely and smoothly, not only on mighty aircraft carriers far at sea, but also on flying fields all over the world.

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*THE SHOCK ABSORBING UNITS ON AN AIRPLANE'S LANDING GEAR; THE NAME IS DERIVED FROM THE WORDS "AIR" AND "OIL"—THE FLUIDS USED TO DISSIPATE THE LANDING SHOCKS

"*Texas* won't be much bigger than *Rhode Island*...

when you're driving a *Cessna Car-of-the-air*"

Captain Floyd Addison, a real Texas rancher when he isn't busy flying Delta Air Lines' big silver ships —gives a fellow Texan a geography lesson on *how to make little ones of big ones.*

"YES SIREE, after the war the old Lone Star State is going to shrink like a twelve dollar suit in a thunder shower," says Captain Addison. "You'll be able to leave Brownsville after breakfast and land in Lubbock, 600 miles away, in time for lunch, because you two'll be flying all over the country in a Cessna Family Car of the Air. And so will everyone else. Why, you'll even be running up to Chicago in an afternoon as naturally as you drive into town today. That's how easy it's going to be to fly that new Family Car of the Air that Cessna's all set to build as soon as the war's over. Believe me, I'm going to get one of those Cessnas. Then, at last, I'll be able to cover the wide open spaces all the way out to that ranch of mine as often as I want to—and that's often."

ARMY E NAVY

OUR PLEDGE

To live up to, and exceed if possible, the high standard of performance for which this pennant stands in the production of Cessna Bobcats and Cranes for the U. S. Army Air Corps and the British Empire Training Program. That is our pledge, our only job today.

FREE! *"Keep 'Em Flying"* Wings

Wear these *Wings-with-a-reason.* You get them free with a 10 cent U. S. War Savings Stamp and a Jap Hunting License when you send 10 cents to . . .

CESSNA AIRCRAFT COMPANY
Department SF, Box 1616, Wichita, Kansas

With The Greatest of *Ease*

That's exactly how this young lady will fly through the air someday. But unlike the young man in the song, she won't have to be daring because she'll take off as easily as she drives her car away from the curb. In the air, her Cessna will practically fly itself. And landing will be like parking a car in an empty ten-acre lot.

The one big difference is that she'll be making trips in her Cessna Family Car of the Air in one-third the time it would take in a car. That will make all America, in fact all the Americas, her playground as soon as victory is won and Cessna can start building the airplane that everyone can buy and fly.

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Cessna

SYMBOL OF *Aircraftsmanship* FOR THIRTY-ONE YEARS

Just Among Ourselves

OUR FIRST TWELVE MONTHS

Fighting against enemies who were allowed to get the jump on us a year ago, we've had our backs to the wall for a large part of the first fifty-two weeks. We have made mistakes, some of which were due to blindness and tradition. We have lost kin and friend. Almost up to year's end we were admittedly losing the war.

What have we gained?

Most importantly, we have started winning. We can keep on winning—faster, if we heed the first year's lessons.

Some people aren't so sure about what we have learned in the air. They hesitate to believe the Japs can be defeated in short order by bombs. Since England withstood the biltz, they aren't certain that Germany and Italy can be made to collapse by remote control through air power. One expert consumed much space in the daily press with his view of the Solomons as proof of the inability of air superiority, which we have possessed there, to dictate terms to hostile sea forces. To hear one side tell it, aviation appears to have fallen short of the supremacy which so many of us have claimed for it.

We think such an attitude deserves careful consideration. More than a few have been allowed to examine air power more closely, and adopt a doubtful reasoning, because events have failed to provide evidence of decisive action by air power. Why the letdown?

In the first place, we have not yet witnessed an all-out display of the kind of air power which Billy Mitchell recommended. This kind of air power has not been practiced by the Germans, the Japs, the British or the United States. Until it is, those who would pass judgment against the bomber would do well to mark time with lesser topics, such as the highly-touted *dual purpose* combat plane, which will soon prove its worthlessness, or the alleged superiority of the blundering night bomber, which the British are said to prefer but which we junked years ago for reasons that are sounder than ever.

The kind of air power which we have *not* used in full scale, but which will make its appearance before we win this war, will succeed by long range and by coldly-calculated efficiency. It is the kind of air power for which Frank Andrews labored when he directed the establishment of the GHQ Air Force in 1935. It is the kind for which the late Nick Craw, the best-informed public relations officer the Air Forces ever had, tried so hard to put across to aviation writers.

Our Flying Fortresses are the backbone of this *decisive* air power. In the numerous, but still too few, raids they have staged over Europe they have demonstrated the prowess which Frank Andrews saw in them almost eight years ago. Only a few agreed with him that bombers could seek out the enemy's homeland and venture beyond the range of escorting fighters . . . that in the end pursuit planes would be looked upon as being no more effective—only 5 per cent or thereabouts—than ground-locked anti-aircraft guns when it came to shooting down heavy bombers. Andrews knew, too, that wasteful bombing at night was nothing more than evasive action, admitting superiority to the fighter without even challenging it.

The kind of air power for which the Flying Fortress was designed, and for which our new super bombers must be perfected, demands above all accuracy. It will select the few important targets in the enemy's homeland and concentrate on them first, attending to the thousands of smaller, unproductive targets later. It will demand highly-specialized planes in other branches, respecting the axiom that improvised weapons attempting dual or varied uses, accomplish little, but sacrifice much in effectiveness . . . fighters for combat, strafers for low-level assault against personnel and field pieces, dive bombers for ships at sea. They've swapped missions before, always at an excessive price.

With this kind of air power functioning, we believe bombers can win the war. We know bombers win air superiority—not pursuit planes. And we know we can't win *without* air superiority.

The first year at war, by scattered and unevenly-connected examples, has taught this—the lesson for which many years of peaceful experimentation should have prepared us.

★ ★ ★

Bits and Pieces

We often glory in the knowledge that our training centers have given us the world's best pilots and that our industry has supplied them with the finest aircraft on the fighting fronts. But with all this the most adept combat units can be whipped by seemingly insignificant items.

While the civilized world marvelled at the heroic Flying Tigers, few realized how near Claire Chennault's squadrons were to collapse. Many times they had to take the full force of Jap attacks while their aircraft remained inert and impotent under jungle trees. They had gasoline. Ammunition was available. They had everything but the seemingly insignifiant bits and pieces and in the pinch the trivials proved insurmountable.

One group of sorely-needed fighters were out of action for want of top distributor shaft bearings—a part that weighs less than two ounces. Somehow these had been overlooked when supplies and parts were shipped to the Tigers. The big essentials, such as crankshafts, pistons, rings and large bearings were all there.

At other times, the Tigers found they couldn't swap parts and accessories. The oxygen tank from one type of plane couldn't be fitted into another in an emergency. Radio sets too frequently were of no use when transferred. The men who had to fight or die were the victims of inefficient preparations and inadequate standardization.

Must we lose our men and machines—the finest in the world—because of bits and pieces?

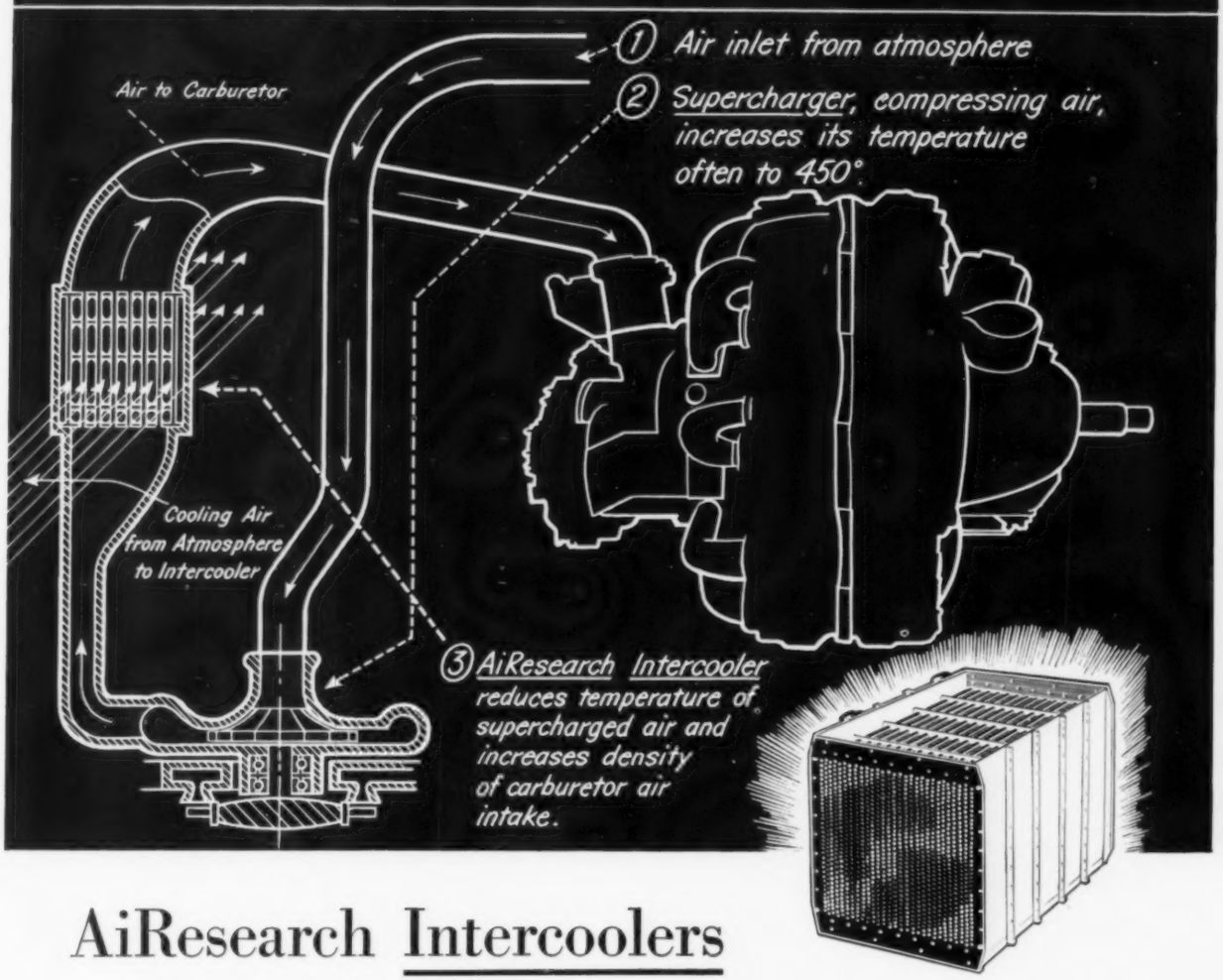
★ ★ ★

For the Record

The ratio of American air victories in February, 1942, was 2 to 1. It jumped to 4 to 1 in August and doubled again in September to approximately 8 to 1. In October, Under Secretary of War Patterson said U. S. pilots were downing 14 enemy planes for every one we were losing.

Since Pearl Harbor the number of plants making planes, engines and propellers has almost doubled, and aircraft manufacture has been more than doubled, says the Aeronautical Chamber of Commerce.

UP goes the airplane's critical altitude...


1 Air inlet from atmosphere
2 Supercharger, compressing air, increases its temperature often to 450°.
Air to Carburetor
Cooling Air from Atmosphere to Intercooler
3 AiResearch Intercooler reduces temperature of supercharged air and increases density of carburetor air intake.

AiResearch Intercoolers

help U. S. engines get *more* from their superchargers

The extreme heat of supercharged air causes detonation, reduces engine efficiency. It decreases the weight of the mixture delivered to the engine—thus reducing the critical altitude of the power plant.

To improve the control of supercharged air temperatures, our engineers developed the AiResearch Intercooler. Thoroughly test-proven in AiResearch laboratories, these Intercoolers are now in use in thousands of American airplanes...helping their power plants deliver *added useable power at critical altitudes.*

The AiResearch Intercooler is very *light in weight.* It is manufactured of heat-treated aluminum alloys. The entire assembly is anodized for protection against corrosion. Tubes are mechanically fastened and are jig-assembled to assure ruggedness.

More than 40,000 *hours of service* have proven this Intercooler's freedom from maintenance trouble.

AiResearch Intercoolers offer utmost flexibility. They are available in flattened or round tubular units. Tests of tube spacing and arrangements prove their adaptability to varied requirements of shape and size.

Aircraft manufacturers interested in the advantages of these Intercoolers are invited to write or wire for details.

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LOS ANGELES, CALIFORNIA
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Automatic Exit Flap Control Systems • Supercharger Aftercooling Systems

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IRVIN Air Chutes

SERVING THE UNITED NATIONS' AIR FORCES

REVVING UP

(Continued from page 6)

desirous of entering the "mystic order." Eligibility consists of a certain elastic connection with aviation and the proper fee, which varies with the number of initiators.

The membership card is a paper specimen of the coin of the realm, suitably endorsed by the initiating committee and later signed by any member whom the holder subsequently brings into the order. A cardinal rule is that any member caught without his membership card must stand the drinks around or pay every member present an unmarked, new "card."

Prime Minister Winston Churchill of Great Britain is a paid-up member in good standing, as are the ranking air chiefs of Britain and the United States. Lieut. Gen. Henry H. Arnold, commander of the Army Air Forces, though a Short-Snorter for many years, recently had to fork up something like $54 when caught without his signed membership bill by that many members.

Churchill very nearly had to pay up on his recent trip to Moscow. First Officer Jack Ruggles of the United States Ferry Command plane he was on, asked the premier to join while flying over German-occupied Europe. Winnie declared he was a member, whereupon Ruggles demanded to see his bill. The British leader had his secretary dig his suitably inscribed pound note out of his bags, according to the tale.

Young King Peter of Yugo-Slavia was made a Short-Snorter by American pilots at an air base in Scotland. Those present say he was tickled to death at being invited to join, and got a hearty laugh over the initiation ceremonies.

American Ferry Command pilots have been missionaries spreading the order throughout the Allied world. Major Ed Coates, former American Airline flyer now with the Ferry Command, has a membership "card" composed of a dollar, a British pound, Brazilian milreis, Indian rupees and several other bills. Signatures include a number of sheiks, shahs and African chiefs initiated during a tour of Africa.

An AAF flyer recently brought back a Short-Snorter bill including not only a dollar and pound, but an Icelandic banknote. Most of the Iceland signatures, bearing names and rank of American officers, had the initials F. B. I. after them. This, it was explained, stood not for Federal Bureau of Investigation, but Forgotten Bastards of Iceland.

Glenn L. Martin, though one of aviation's oldest figures, became a member only recently. He was initiated at the home of Mrs. Joe E. Brown in Beverly Hills, California. Among those who initiated Martin and signed his bill were Short-Snorters Linda Darnell, Mary Brian and Ann Miller, Hollywood stars. Glenn and Joe E. Brown, the big-mouthed movie comedian, are great friends who used to barnstorm together thirty years ago.

Origin of the Short-Snorters is lost in antiquity, though many say that it was founded by Alaskan sour-doughs in the years past and picked up by the early Alaskan pilots. Virtually everyone in American aviation became a member years ago, after which the "club" became dormant until revived more than a year ago by AAF pilots.

Countless are the stories told of and by Short-Snorters. Consolidated President Harry Woodhead was "caught" and initiated by nearly one hundred of his plant foremen at a dinner they held, at which he was principal speaker. Lieut. Col. Cliff Henderson, former National Air Races majordomo, now with the Ferry Command, was initiated by eighteen Short-Snorters at a cost of $18.00 in Trinidad. He went shopping the next day, spent his membership bill by mistake and was hooked for $18.00 over again.

Most fabulous Short-Snorter story, however, is one which we refuse to vouch for. It is that two Jap pilots were shot down by the Flying Tigers over an AVG base in China and taken prisoner. Both, so the story goes, had spent some time in the United States prior to Pearl Harbor. When brought into camp, it is said, they claimed membership in the Short-Snorters, produced membership bills and demanded the Tiger pilots show theirs. * * *

Airacobra Pilots Going Into Action

HEADACHES FOR HITLER—Coming Up!

Over the loud speaker at a distant Allied Air Base comes the warning call "Enemy Aircraft Approaching—Scramble." In trigger-quick response—fighter planes are manned. Then, with deafening roar, a squadron of Army Airacobras takes the air.

Courageous and determined, these Army Air Force Pilots rise to combat, confident that they man the hardest-hitting single-engine fighters in the world. These men deserve the best America can put behind them.

A forward looking Aircraft Industry had sensed for years America's need for fighter planes that would out-fly and out-fight the best the enemy could offer. While ominous war clouds gathered into thunder-heads new plans and planes were under way.

Working with our Army Air Force we created the P-39 Army Airacobra. Free from precedent our engineers developed a new design from nose to tail. They put a cannon in the nose—placed the engine behind the pilot—gave it a tricycle landing gear. They made it a powerful weapon designed expressly for the needs of war.

Today these deadly fighter-planes serve Allied forces on fighting fronts around the world.

But some day victory will come. War-trained pilots will return to take their places in a new world of accelerated transportation. America will create new planes to carry on her commerce in the skies.

That day will find Bell Aircraft ready—ready with its engineering skill, assembly lines and trained personnel converted to the pursuits of peace-time aviation. © Bell Aircraft Corporation, Buffalo, New York.

Airacobras for victory—

FUTURE PLANES FOR PEACE

BELL *Aircraft*

PACEMAKER OF AVIATION PROGRESS

Army's AT-9 Transition Trainer

Navy's SNC-1 Advanced Tra

Tomorrow's

ARMY AND NAVY HEROES OF THE AIR

SECOND PRINTING: Send 10¢ for **your** copy of this fascinating 96-page history of aviation by Assen Jordanoff, author of "Your Wings"; with illustrations of current fighting types. Airplane Division, Curtiss-Wright Corp., Buffalo, N. Y.

Curtiss-Wright fighters, dive-bombers, observation and military cargo airplanes are conspicuous constantly in the war's headlines. But behind these headlines is another type of Curtiss-Wright ship—the trainer—in which thousands of America's superb fighting pilots today are winning their wings. Twenty-five years of development lie behind these modern training planes—for the world's earliest trainers were the famous "Jennys" of World War I.

CURTISS-WRIGHT
Corporation
AIRPLANE DIVISION

FIRST
Since the Birth of Aviation

1917•The world-famous Jenny (JN-4D) of World War I. About 5000 were delivered to the U. S. Army Air Corps and our allies. Maximum speed, 75 m. p. h.

1927•The Curtiss Hawk (AT-4) Advanced Trainer. Its 190 H.P. engine gave this ship a high speed of 133 m.p.h.—a cruising speed of 106 m. p. h.

1929• The Curtiss Navy Fledgling primary trainer (N2C-1). High speed, 108 m. p. h.; cruising, 87 m. p. h. Powered with a Wright J-5 engine.

1930•The Curtiss Army Falcon (BT-4)—a basic trainer with a high speed of 140 m. p. h. and a cruising speed of 112 m. p. h.

E.L.I. PRECISION-BUILT

INSURE *Safe* LANDINGS

THERE is hardly need to point out that only precision manufacture to an exacting degree, will suffice in the manufacture of landing gears and shock struts. On them depends safe landings under the most difficult war conditions. Like the many aviation products we build, E. L. I. maintains the highest precision standard in the manufacture of Main Landing Gear and Tail Wheel Shock Struts, Landing Gear Screws and similar products.

E. L. I. is pledged to help the United Nations finish the job!

Illustrated are oil—air main landing gear and tail wheel shock struts. Arc and acetylene welded, hard chromium plated plungers with top of the latter, cadium plated. Landing gear screw and nut with acme thread, hard chromium plated.

LANDING GEAR SCREW

Engineering Laboratories, Inc.

CONSULTING ENGINEERS & MANUFACTURERS

TULSA, OKLAHOMA, U. S. A.

EQUIPMENT IN WORLD-WIDE USE

Throughout the past eleven years, E. L. I. as one of the largest geophysical research organizations in the World has contributed many instruments and developed services vital to the Petroleum Industry.

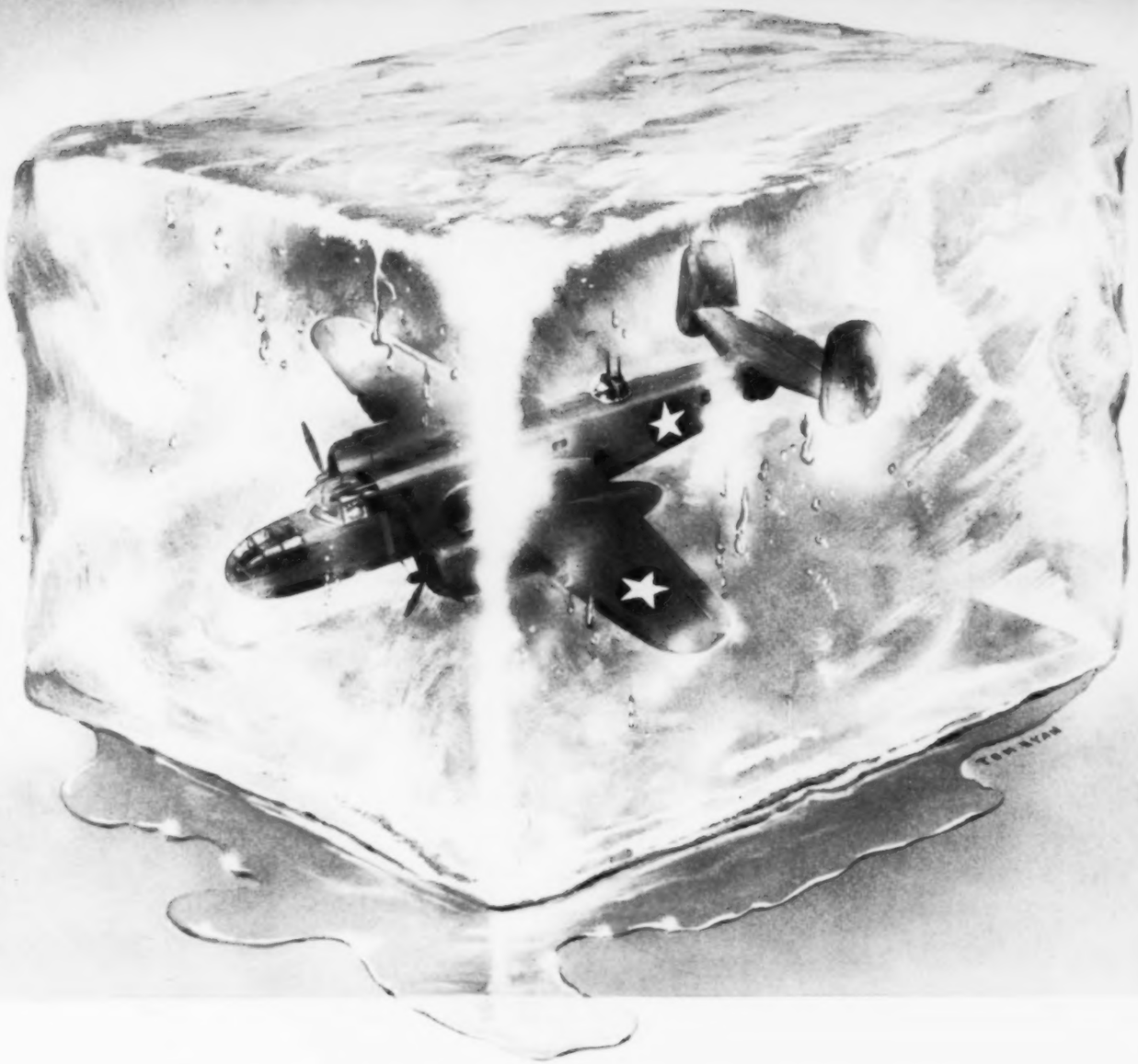
Who are these Men and Women?

They are the Experimental Department personnel who built the world's largest flying boat—the Navy's new Martin Mars . . . What have they done? They have put in the air a flying giant that points the way toward winning the war and winning the peace . . . Inevitably, great cargoes of men, munitions and supplies must be carried by air before the battle is won. Inevitably, fleets of huge ships will stem from such pioneering as this; ships which will transform the face of war . . . And beyond war lies the peace—where air commerce will move peoples and their products, will cement new friendships and help bury old hates, suspicions and jealousies. World peace will be built on world understanding made possible by air-commerce . . . What have these men and women done at Martin's? They have done more than build a great airplane. They have helped America take a new step toward Victory and World Peace.

THE GLENN L. MARTIN COMPANY, BALTIMORE, MARYLAND, U. S. A.

Martin
AIRCRAFT

Builders of Dependable Aircraft Since



We could have done this a year ago

The calendar says the United States has been at war one year.

But here at North American Aviation we've thrown the calendar away. Today we are building planes that are *years* ahead of the planes we were building in 1941.

Those late-1941 planes of ours were *good*. According to one theory of production we would have been justified in "freezing" the designs we had in production last December 7 and concentrating entirely on turning out those planes. But we don't work that way, nor do the Army and Navy work that way.

We know frozen weapons won't win the war, because the war itself can't be frozen. So we keep our production methods flexible, and whenever battle experience or engineering genius or mechanical skill suggests a change that will improve our planes, we make the change—and look for other improvements.

That's why "North American Sets the Pace"—why our planes are selected for such missions as the first raid on Tokyo (North American B-25 bombers) or to bear the brunt of low-altitude fighting over Nazi-held Europe (North American P-51 Mustangs).

We are making these better planes so much faster that we passed our 1942 production quota months ago. But today, as always, the main idea of every North American employee is to make every North American plane the best bomber, fighter or trainer that can possibly be produced *at the moment* it is completed.

You—the taxpayers and Bond-buyers of the nation—pay for the planes we build. Your sons, brothers, sweethearts and husbands fly them. We need no other reason to continue building the best planes that skilled hands and unfrozen brains can build.

NORTH AMERICAN AVIATION, INC., Inglewood, California

Plants in California, Kansas, and Texas

MEMBER, AIRCRAFT WAR PRODUCTION COUNCIL, INC.

BOMBERS **FIGHTERS** **TRAINERS**

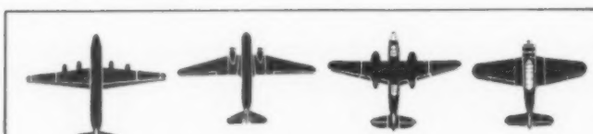
BONDS BUY BOMBERS! The War Savings Bonds you buy put bombers in the air. Buy Bonds every payday.

Join the Army or Navy Air Force

NORTH AMERICAN *Sets the Pace!*

JOHNNY SKYTROOPER, U.S.A.

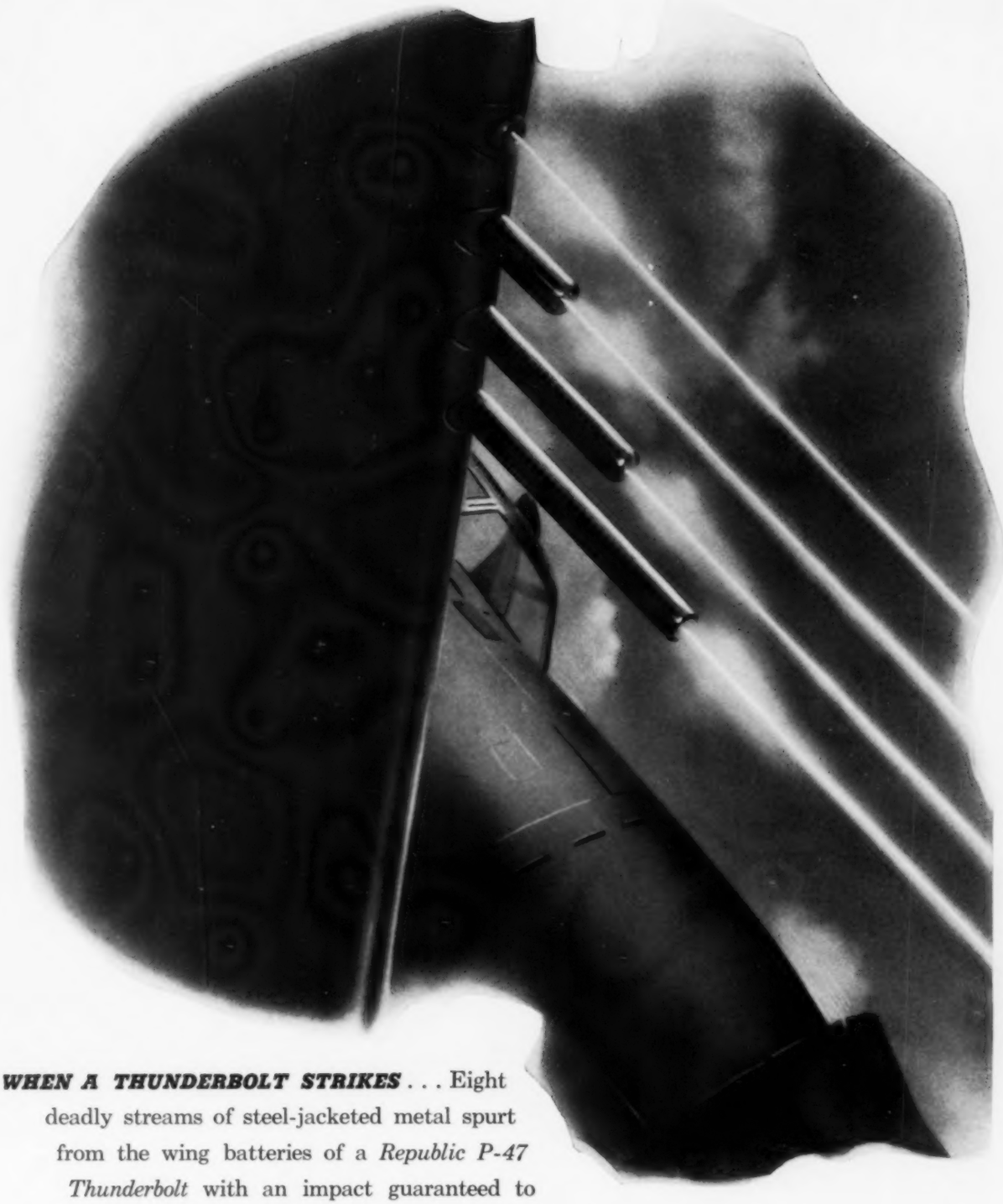
LOOK OUT BELOW! Johnny Skytrooper is rough, tough and nasty. Striking behind enemy lines he hits hardest where it hurts the most. Douglas C-53 "Skytrooper" transports carry him swiftly on his mission of destruction; Douglas C-47 "Skytrains" and C-54 "Skymasters" follow through with his supplies. Setting the pace for war transport production, Douglas is proud to provide the equipment for Johnny Skytrooper to "win with wings." Douglas Aircraft Co. Inc., Santa Monica, Calif.



Left to right (1) C-54 "Skymaster" (2) C-47 "Skytrain," C-53 "Skytrooper" (3) A-20 "Boston," A-20 "Havoc" (4) SBD "Dauntless" TBD "Devastator," A-24 "Banshee"

DOUGLAS

MEMBER, AIRCRAFT WAR PRODUCTION COUNCIL, INC.



WHEN A THUNDERBOLT STRIKES . . . Eight deadly streams of steel-jacketed metal spurt from the wing batteries of a *Republic P-47 Thunderbolt* with an impact guaranteed to tear apart any Swastika'd Hun or ruddy Rising Sun that dares fly within range.

REPUBLIC AVIATION

REPUBLIC AVIATION CORPORATION

REPUBLIC AVIATION

FARMINGDALE, L. I., NEW YORK

The Man Behind the Man

BEHIND THE CONTROLS!

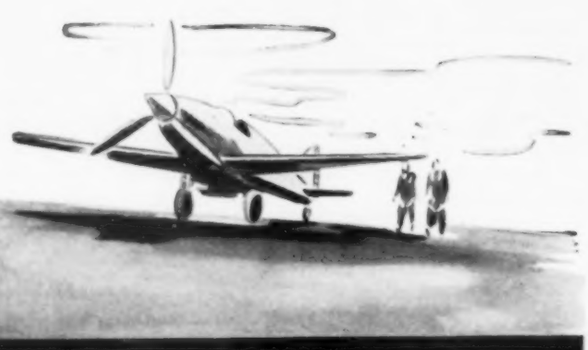
Like the man behind the man behind the gun . . .
he is the very backbone of America's fighting forces!

Training pilots for the Army Air Forces is the biggest part of our job now at Georgia Air Service, Inc.

Maintaining the ships those cadets fly is a vital part of training pilots . . . and an equally big responsibility.

For every pilot we have sent gloriously into the skies over Germany . . . Libya . . . The Solomons . . . there's an unsung hero who made it possible for him to fly.

We offer this open word of gratitude to our own mechanics, electricians, linesmen, and other aircraft maintenance specialists. We realize that each . . . is a man . . . behind the man . . . behind the controls!



GEORGIA AIR SERVICE

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ATLANTA, GEORGIA

Flight Contractors to U. S. Army Air Forces, Bennettsville, S. C., and Jackson, Tenn.

Lessee-Operator Atlanta-Marietta Airport

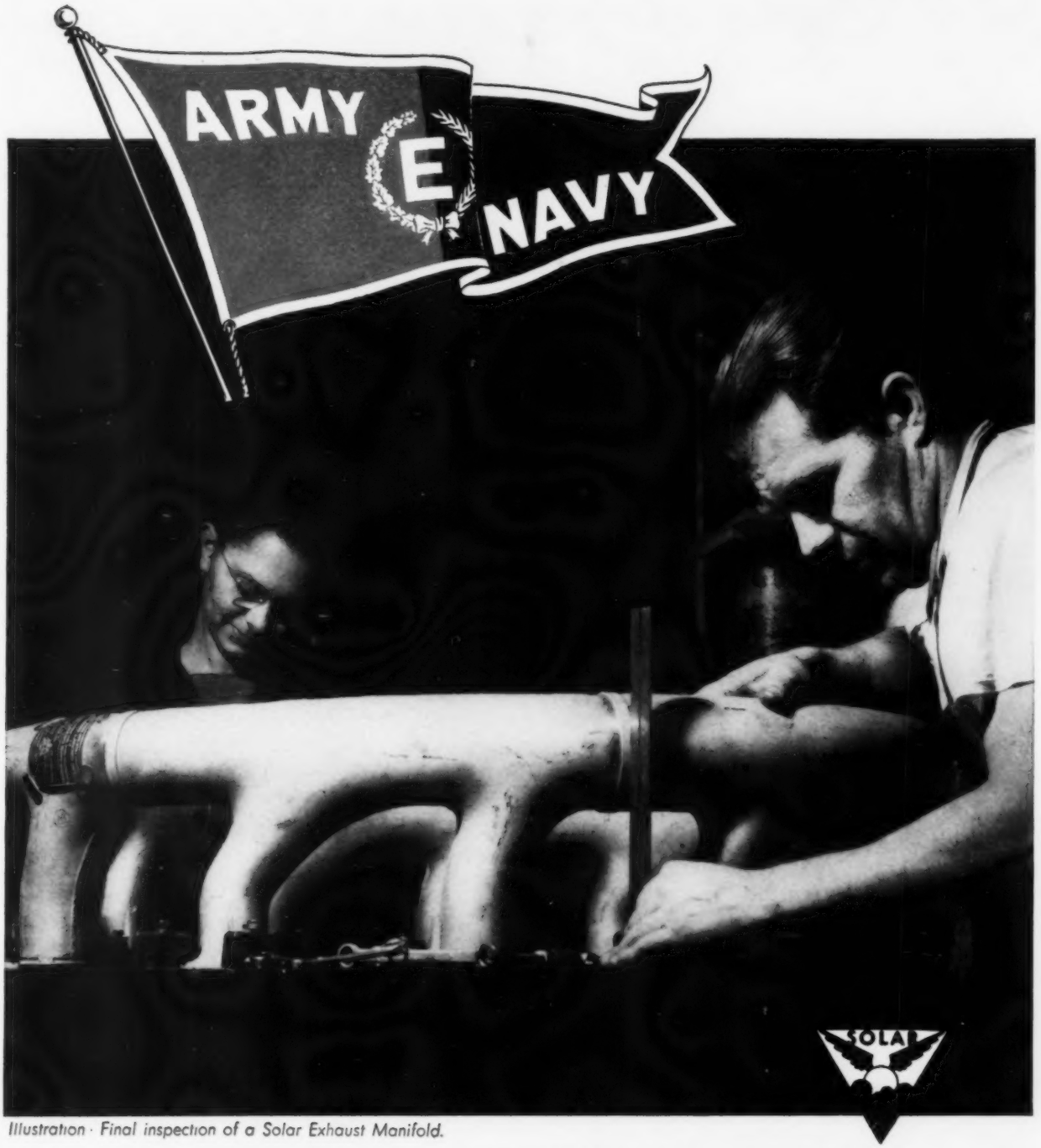


Illustration · Final inspection of a Solar Exhaust Manifold.

"—for accomplishing more than seemed reasonable or possible a year ago"—the men and women of Solar Aircraft have received the Army-Navy Production Award. Proudly will this pennant fly—an inspiration to greater achievement.

SOLAR

EXHAUST SYSTEMS—

SOLAR AIRCRAFT COMPANY ★ SAN DIEGO, CALIFORNIA

Sighted Fortress—built same

THIS young sharpshooter is lining up a wing jig for a Flying Fortress.*

From where he stands (in the wing shop of the Boeing Seattle plant) he can see that the wing of the big B-17 he is helping to build is going to be straight and true. He can see that this Fortress, like the ones that went before it, is going to be very bad medicine for the Axis.

Wing jigs are the "forms," the giant tools, in which the wings are built. The Boeing jigs are three stories high, built of steel tubing. They are big enough for large crews to work freely on each "floor." They are accurate enough to be adjusted to 1/1000 of an inch.

Jigs are tools, and the Boeing jigs are part of the more than 200,000 special tools and machines designed by Boeing tool engineers, and built by Boeing technicians, for the swift, smooth-flowing production of Flying Fortresses and other war planes. It is the combination of these tools, plus the men and women who use them, that won for Boeing the signal honor of being selected as the first aircraft manufacturer to receive the new Army-Navy award for efficiency.

There are several thousand engineers now at work in the Boeing plants. Their know-how ranges over the whole field of engineering. They represent more than twenty-five different kinds of engineering skill. Whether they are designing a wing for a new airplane, a spiral staircase for a Clipper, or a machine that will turn out parts 20—50—100 times faster, Boeing engineers bring to the job an understanding that it must be a better job than ever has been done before.

The designing of tools and machines with which to build new kinds of equipment . . . for war and peace . . . is only one of the many projects that form a constant part of the Boeing engineering schedules at Seattle and at other plants in the Middle West and Canada.

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADE-MARKS

Knights in Armor

Over Europe, in Asia, in Africa, in the South Pacific and in the Aleutians, American Flying Fortresses are smashing the enemy at every turn. This long-range, high-altitude bomber is wearing something new—something that has given it remarkable *defensive* ability—even when fighter escort is lacking.

This great offensive airplane now wears a coat of mail in the true manner of the knights of old. Deadly defensive blows from the "belly bubble" and its companion upper turret protect this modern knight in reaching his objective, raining havoc on the enemy, and returning to base. Every angle of attack is covered by machine-gun fire from these precision power-controlled Sperry turrets and the Boeing "stinger" in the tail.

A product of Sperry laboratories, the development, design, scientific investigation and engineering of both the upper turret and the lower ball turret were accomplished a full year before Pearl Harbor. At the outset of hostilities other manufacturers, under license, were soon able to take over the production, and quantities of this vital equipment are now flowing from their assembly lines.

Sperry Gyroscope Company, Inc.

BROOKLYN • NEW YORK

—Higgins Photo by Menge.

PLANS FOR MANUFACTURING 1,200 plywood Curtiss Commandos first and later a number of huge semi-flying-wing cargo planes of their own creation are being discussed here aboard a torpedo boat at New Orleans by (left to right) Vice President Jack Jouett, President Andrew J. Higgins and Designer-Plywood Expert Harry Atwood of Higgins Aircraft, Inc.

What About Higgins?

By TOM ASHLEY

A FRIEND of ours who does more than his share of worrying about such things dropped us a note recently inquiring about Andrew J. Higgins, the New Orleans boat builder. "Folks around Washington think Higgins will get a contract for aircraft," he wrote. "What about this guy Higgins?"

That's all he asked. But anybody familiar with aircraftsmen will recognize immediately what he was driving at. He wanted to know whether this would be another Henry J. Kaiser affair. One Kaiser is more than enough, apparently. So we got to wondering, too. Was the good old South, where aircraft manufacturing has expanded so rapidly, in for a second edition of the Kaiser dilemma? The stage for Higgins' grand entry into aviation appeared to be similar, at least in the props surrounding it, to the West Coast shipbuilder's coming-out party a few weeks previously.

Higgins vs. Kaiser

But before we could settle down into a little figuring it was announced in Washington that Andrew J. Higgins would receive an order for 1,200 Curtiss Commando transports—plywood versions called the C-76. Thereafter the semblance of Kaiser began fading away, for here was a practical approach to the task of putting shipyards to work for air cargo. Andrew J. had talked of big drawing board stuff, to be sure, but in the clinches he shelved his own plans for real, in-the-skin airplanes. Whereas Henry J. left Washington with an order for three of his (and Howard Hughes') seven-engined dream ships of breathless proportions, the Bayou Boatman returned to New Orleans to build twin-engined landplanes which not only had been engineered and test-flown but were already in operation. Moreover there's nothing very breath-taking about a thirty-six-place transport of the Commando's dimensions.

We journeyed to the Crescent City to find out for ourselves just what the score could be. What's going to happen when, if and after Higgins turns out 1,200 cargo planes for Roosevelt, Curtiss and the War Department?

We had no sooner partaken of *pompano en papillote* than we ran smack into Brother Vincent. Vince keeps you satisfied while the bartender waits on soldiers and sailors first. "What," we asked Vince, "about Higgins and all this airplane talk?" The last time we were in New Orleans Huey Long was king. But this time Vince says it's A. J. "Mister Higgins," he says, "can have anything he wants around this place. Mister Higgins will have airplanes stacked up all over New Orleans before you know it." We learned later that Mister Higgins certainly has his boats all over the place—torpedo boats, invasion boats, tugs, tank barges and the like by the hundreds are literally rolled out of the several Higgins factories in bunches. Maybe Brother Vince is right about the airplanes.

Jouett Explains Setup

Colonel John H. Jouett was busier than we ever saw him when we reached his office. Fresh from Washington, where he had stepped out of the presidency of the Aeronautical Chamber of Commerce, the Colonel was trying to do several things at once, not the least of which concerned the assembly of executives and engineers to push the aircraft work faster and faster ahead.

Jouett and Higgins first became acquainted in 1929, when the Colonel was commanding officer of the Third Attack Group. In 1930 he resigned from the Air Corps after twenty years of service and took charge of the aeronautical division of the Standard Oil Company, which operated a fleet of planes out of Menefee Airport in New Orleans.

"It sure feels good to be back in New Orleans after an absence of twelve years," he told us.

Colonel Jouett is vice president and general manager of the newest Hig-

gins enterprise—Higgins Aircraft, Incorporated. A. J., Sr., is president, and Frank O. Higgins, his son, is vice president in charge of all aircraft production and related activities. Their full staff of executives and engineers will be announced later, but the chief engineer is already at work. He is George Allward, who came from Howard Hughes' organization, in which he was production manager of subcontracting. Previously Allward had been chief engineer for Duramold and before that was project engineer for Fairchild and others during his fifteen years of experience in aircraft plywood.

Harry Atwood, with Guisseppi Bellanca, holds forth in still another Higgins' enterprise—a separate and super secret off-shoot devoted exclusively to research and experimenting. Atwood has developed a sensational kind of woven plywood and an even more sensational cargo plane design. Both are cloaked in secrecy.

"Remember this," Colonel Jouett started. "Mr. Higgins is in aviation for keeps."

Battle of the Bureaus

Now we were getting somewhere.

"Right now we're concerned primarily with building 1,200 plywood Curtiss Commandos — quickly," he continued. "We have started work on a project to utilize the Micheaud yard. Facilities there should be completed within ninety days. In six months we will deliver our first airplane. That is Mr. Higgins' schedule and that is what will be done."

While the Colonel greets a Senator over in A. J.'s office, we'll interpret some of his opening message for you. The Micheaud yard is where Higgins was going to build a fleet of Liberty cargo ships. The Maritime Commission cancelled the contract on this, however, and there developed quite a controversy between A. J., who is quite outspoken, and a lot of Washingtonians. That led to the White House, where President Roosevelt was reported as having expressed the wish that the Micheaud yard be utilized, whereupon the War Department took up the matter of using it for aircraft construction. A letter of intent was quickly prepared and assigned and the Army Air Corps went through the necessary steps to acquire title to the Micheaud yard. All the while the Maritime Commission, having cancelled the Liberty ship order, had dutifully begun the dismantling of the Micheaud works. The day we arrived in New Orleans the Maritime Commission was still dismantling, letter of intent or no letter of intent. A Higgins' crew was chompin' at their bits to start rebuilding, but the Maritime crew wouldn't stop tearing down, nor would they leave. All A. J. could allow was that the Maritime Commission hadn't yet received full notice that they were tearing down Air Corps —not Maritime—property.

The factory site comprises about 1,200 acres. Some people, especially hillbillies, will sooner or later call it a swamp. But the site is actually six feet above sea level. That's high ground around New Orleans, for the site is twenty-one feet higher than a large portion of the Crescent City. The factory plot has two seaplane runways, each 700 feet wide by 8,000 feet long and forty feet deep. They won't be needed for the Commandos, which will use new hard-surfaced runways, but when the time for flying boats materializes, Micheaud will offer water runways in two different directions.

Colonel Jouett said the factory will be ready for work within ninety days. That means just exactly what it says, we gathered, even if an Albert Kahn feat has to be accomplished in record-breaking time.

Higgins Also Has an Engine

He also said the first Commando will roll out of the factory in 180 days. Here we encountered hush-hush talk. Higgins Aircraft, Incorporated, isn't saying how. It will be mass production, yes. It will involve innovations in assembly-line technique, yes. But no details, except this little hint which only serves to complicate the matter:

There will be little or no outside subcontracting.

By the time you figure that one out, Higgins will probably be delivering Commandos. And by that time, also Higgins will be well along on another project or two. One of these concerns engines, the other airplanes of a different type than the Commando.

At the same time the initial aircraft order was negotiated, Higgins received another contract about which little mention has been made. It is for the manufacture of marine engines which his company has developed over the last several years. Details are shrouded in secrecy for military reasons, but the Higgins' engine was pictured as being "a very highly efficient marine engine, the purpose of which cannot be disclosed." It will be for marine power, but engineers have claimed it "may be adaptable as a 2,000-horsepower engine for aircraft." The contract provides for $2,000,000 for machine tools and other equipment for engine manufacture, the cost to be divided equally by the Army and Higgins.

The other project concerns Higgins' own ideas in aircraft. It is entirely separate from the Commando work, and every precaution is being taken to divorce the two ventures as completely as possible. In other words, according to Col. Jouett, Higgins insists that his work be satisfactorily completed on the initial order before consideration is given to his own theories.

That's where A. J., Sr., and his sons have impressed important leaders from the White House on down. Talk to them and you learn quickly that they aren't kidding themselves about airplanes. Take Frank, for example. He's vice president in charge of production of Higgins Aircraft, Inc. We talked with him while trying out one of the famous Higgins' motor torpedo boats.

"If you turn out airplanes the way you have delivered boats you'll really have something," we commented.

"Yes, but we know a helluva lot about boats that we don't know about airplanes," said Frank. "We'll turn out the airplanes all right, but we're going to use men who know as much about planes as we know about boats."

While manufacturing Commandos under license from Curtiss, Higgins Aircraft, Inc., will build the foundation for the big carriers which the less-cautious Kaiser has undertaken in the raw.

Little could be learned of the kind of transoceanic cargo plane which Higgins will experiment with. All that can be said is that it will utilize the wing for cargo space. But it is not expected to be a pure flying wing type. It will be constructed of plastic plywood—Southern-grown and Southern-made plywood.

Native Wood Adapted

Meanwhile, he and his executives were scheduled to begin an Army-sponsored tour of aircraft factories. Col. Jouett and George Allward were delving deeper and deeper into the talents of the best men available. Harry Atwood went back to his Arkansas laboratory where he is producing miracles in woven plywood.

Higgins is energetically blazing the way for a new and effective utilization of materials which are found in abundance in Louisiana and other Southern states. They don't need mahogany. They don't have to rely on rare plastics. They can by-pass the shortage in aluminum and other precious alloys.

Higgins will build and operate his own plywood factory. Logs will be floated into it by Louisiana's bayou-canal system.

The most important thing to remember about Andrew J. Higgins, the New Orleans boat builder, is what Colonel Jouett has said:

"Mr. Higgins is in aviation for keeps."

Lessons in Maintenance From The Flying Tigers

FIGHTER FIXIN'S

By TYE M. LETT, JR.

The AVG, victorious though outnumbered in the air, almost lost on the ground because of inadequate parts and an inexcusable lack of standardized equipment. Here's how—as told to the SAE by the Allison engineer who helped them win.

WE operated under continual alerts, warming the planes up periodically, so that they could take off on a minute's notice. Under such a situation, the responsibility of operational control—getting ships off on schedule, precautions to prevent collision during landing and takeoff—had to be assumed by the fighting units. Often wartime operational control is not thought of until a unit goes into action. That was the case with the AVG, operating on an Allied Air field.

In Rangoon we had a three-strip runway type of landing field. Planes took off and landed without any control tower or central guiding point. We found that we had a particularly dangerous spot where the runways converged. One Squadron took off on one runway, the other on the second. Due to lack of central control, we had several near-collisions during takeoff in the heat of battle.

Putting the AVG on Wheels

This was solved by sending a man down to the intersection of the runways. He cleared ships with a red and white flag during take-off. It is funny but a fact that simple precautions taken during peacetime are absolutely forgotten when you are in a war and your ships multiply in value. These simple precautions, obviously, should be heightened during wartime to avoid losses, which might mean disaster.

It was apparent that the only way we could operate, from a maintenance point of view, was to mobilize the ground crew of the AVG. This decision was made at a conference with Squadron Leader John Newkirk and Crew Chief Fox, who inspired the meeting. I was delegated to appeal for help from Lieut. Col. Twitty, commanding officer of the American Military Mission in Rangoon. I told him that, without vehicles, the ground crew would be unable to protect their materials, and the AVG, which was already showing its mettle, would be out of the war. With the Colonel's help, we eventually rounded up, from British, Chinese and other sources; four Chevrolet Command cars; six GMC 6x6 trucks; six Studebaker and Chevrolet tank trucks, complete with pumps and equipment for refueling planes; six jeeps.

Fortunately, I was in a position to exert some influence in this hasty program of mobilization. General Motors had been appointed setting up agents for the handling of lease-lend shipments of military vehicles to Burma for the American Government. There were quite a few vehicles available on the Rangoon docks, and the Army could commandeer them.

We used the 6x6 trucks for handling ammunition, tools, parts and other things of that type, as well as members of the ground crew. Squadron and vice squadron leaders were assigned to command cars; pilots and ground crew chiefs to the jeeps. We soon had the *entire AVG* on wheels.

Mobilization was our salvation. When the air alarm sounded, all planes —on the alert and ready under Chennault's 15-minute rule—were taken off by the pilots. While the planes circled to attain fighting altitude, the ground crew loaded all materials on the field for operations on the trucks and drove them, hell for leather, to dispersal points already designated. Tank trucks, likewise, were dispersed immediately after refueling.

Lessons Learned the Hard Way

In most instances, the squadrons took off within two minutes, and the ground crew had cleared the field within three. Any plane, unable to fly, was dispersed along with the trucks. If the Japs succeeded in coming over, all they found was a bare field and whatever buildings had not been bombed out previously. With the Flying Tigers on their tails, it was impossible for the Japs to hunt out the evacuated trucks and strafe them. No one in the ground crew got hurt, once this system was put into operation.

As soon as the raid was over, we would be back on the field, preparing for the landing of our P-40's. Often we would have to fill in bomb craters to get the field in shape. A lot of ink has been spilled to tell about how quickly the Burmese and Chinese got the landing fields into operation again. The Chinese did an almost superhuman job in this respect, the best they could without material and power-driven equipment. However, at Rangoon, it was handled very badly. Our Rangoon base was under constant bombardment. There were no trucks, loaded with gravel, ready to dump. Finally the AVG had to take the initiative and use power-driven machinery. One good bulldozer, handled by a Texas pilot, Tom Jones, could do the work of a division of soldiers.

I would say that complete mobiliza-

(Continued on page 43)

Hard-boiled babies

Adolf...here's that bomber—*again.* This hard-boiled baby helped stall your *Wehrmacht* at Dunkerque...and just the other night it was back blasting your ports, hounding your shipping.

Hermann...it's that Hudson your *Luftwaffe* has never really stopped...the ship the R. A. F. calls "Old Boomerang"—because it always comes back.

Hirohito...Tojo's met this Lockheed too, and he'll keep on meeting it...lots of places, and doing lots of things. For the Hudson not only does a job; it invents new ones for itself!

And, boys, it's got a big brother, the Vega Ventura, that has all the family characteristics, and some new tricks of its own! Lockheed Aircraft Corporation...Vega Aircraft Corporation...Burbank, Calif.

for protection today, and progress tomorrow, look to

Lockheed

FOR LEADERSHIP

Member Aircraft War Production Council, Inc.

BILLION DOLLAR BABY

Igor Sikorsky understands the limitations of the helicopter. Even so, he predicts the VS-300 will lead to a billion-dollar helicopter market by 1955.

By ESTHER H. FORBES

WHEN, as a boy, Igor Sikorsky first became fascinated with the idea of flying, he thought in terms of a helicopter. At the age of twelve he succeeded in making a model helicopter which could rise in the air. At twenty he constructed a real helicopter with a 25-horsepower engine, his first flying machine. But it was not until thirty years later, in 1939, after he had designed the world's first four-engined bomber and first transoceanic flying boat, that he constructed a helicopter which could lift both itself and an operator in the air.

While young Igor was in Germany with his father in the summer of 1908, he read a newspaper account of one of the Wright brothers' successful flights in a heavier-than-air machine. Spurred on by this, he began his first steady work in aeronautics in his hotel room, concentrating his experiments on various types of helicopters. After returning to his home in Kiev, he explained his work to his older sister, who became tremendously interested. That December she gave him the money to go to Paris, the aeronautical center of the world at the time, and to buy an engine and other parts he would need to build a helicopter. Against the advice of many "experts", who told him he was wasting his time and effort on the impossible, he set to work in 1909 on his first helicopter.

Stopped Tests to Build S-1

As its name implies, a helicopter is a flying machine with rotating wings above the machine. Sikorsky's first helicopter had two rotors with two blades each. When it was completed and tests were started, he had to make many adjustments, but finally, on one test, he could feel that the rotors were supporting a good part of the weight. Though greatly encouraged, he soon realized that this helicopter would never be able to lift both itself and a pilot. And so, having gained a store of valuable experience and information, he disassembled the machine and began plans for another.

In 1910 Sikorsky started to build his second helicopter with a new 25-horsepower engine and also his first airplane, the S-1. Although tests showed that the second helicopter could lift almost its whole weight of 400 pounds, indicating that with enough power and the proper design,

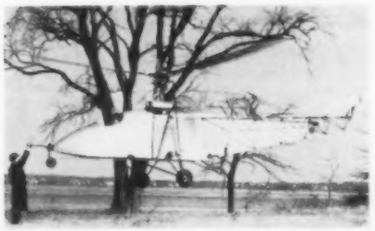
it could lift an operator too, his intuition told him that he had much to learn before he could build a successful helicopter. Therefore he turned his attention to the S-1, convinced that experiments with airplanes offered him a better chance for discovering the principles of flight.

During the next thirty years Sikorsky became famous throughout the world as the designer of large multi-motored airplanes, but he never lost sight of his original aim. That aim was to build a flying machine which anyone of average intelligence could operate from any small plot of ground. While the automobile was still a novelty, he envisaged a world in which men, flying their own helicopters, could travel quickly anywhere over any route.

On May 20, 1940, Sikorsky proved to the world that his scheme was practicable. For over a year he had been devoting a large part of his time to designing and experimenting with the VS-300 helicopter, powered by a 75-horsepower Franklin air-cooled engine. At last it was finished and ready, with Sikorsky at the controls, for its first public flight from the airport adjacent to the Vought-Sikorsky plant in Stratford, Connecticut. With a small group of people looking on, he revved up the engine and applied the power. Slowly he began to move straight up in the air. He had built the first successful direct-lift machine in America and the first successful single-main-rotor helicopter in the world.

Tail Propeller for Steering

Although it may seem only natural that an aircraft designer should test his brain child, very few actually do. Sikorsky, however, ever since building his first helicopter, has made a point of testing personally all his machines that incorporated any radically new feature, and many others, too. He once stated: "What wonderful progress would humanity make if foolish and false ideas in philosophy of life and political economy eliminated themselves, with their creators, as completely as the mistakes of a pilot-designer eliminated him and his machine."



PERFECT CONTROL is shown by the VS-300 as it touches palm of man under tree who has not moved from predetermined spot.

HOVERING TO AID stranded man shows helicopter's possibilities for varied missions in military operations.

Since that first flight Sikorsky has made hundreds of others, continually trying out new ideas. After various experiments with auxiliary propellers for torque compensation and directional control, he now has only one auxiliary propeller, rotating in a vertical plane, at the tail of the fuselage. In 1941 he replaced the original engine with a 90-horsepower Franklin air-cooled engine. That year, too, he put the helicopter on rubber floats and, on April 17, made the first amphibian flight of a direct-lift aircraft. After taking off from the Housatonic river, he landed first on the water and then on the ground without making any adjustments. A few weeks later, on May 6, he established a world record for helicopters by remaining in the air one hour, 32 minutes and 26 seconds.

Simple Controls Explained

The record of which Sikorsky is most proud, however, is his construction of the world's first simple helicopter. The most versatile power-driven machine in the world, the VS-300, can rise straight up in the air, can hover there indefinitely and, whether in the air, on land or on sea, can move in any direction—forward, backward sideward or diagonally. Yet, in spite of its complete three-dimensional maneuverability, Sikorsky says that it is easier to manipulate than an automobile.

Actually the VS-300 has only three controls, corresponding with the three dimensions. In front of the driver's seat and to the left is a lever, resembling the brake of an automobile, whose purpose is to control the vertical movement of the helicopter. Directly in front of the seat is a stick which controls the machine's direction forward, sideward or backward. And on the floor are two pedals which, by controlling the tail rotor, permit directional control.

Now imagine yourself in the driver's seat, about to take off on your first flight. Accustomed to take-offs down long runways, you doubt the possibility of a direct-lift machine. You want to see for yourself whether this helicopter really will rise straight up in the air. As directed, you push the starter, open the throttle and wait until the tachometer on the dashboard tells you that the rotor blades are making 240 revolutions per minute. Then you pull the left-hand lever slowly toward you. As you do this, the pitch of the rotor blades changes so that the blades bite more deeply into the air. At the same time the throttle opening is automatically increased to supply the increased power which is needed. The incredible happens. You begin to rise, just as if someone were pulling you by a string from above.

Back-Stick for Reverse Flight

When you are about 1,000 feet from the ground, you adjust the left-hand

RESTRICTED AREA of packing boxes was no obstacle here. The VS-300 landed atop the crates with the pilot avoiding spaces between boxes. Takeoff was just as easy.

lever by pushing it slightly away from you until the machine is hovering there. Now you turn your attention to the control stick in front. Push it forward a little and the machine starts slowly ahead. Push it forward farther and the machine picks up speed. Satisfied, you pull the stick back and, to your amazement, you actually do go back. Then, for the final test, you move the stick to the right and find yourself traveling at a 90-degree angle to the fuselage. All the while you have stayed at the same level, 1,000 feet above the ground.

Having become well acquainted with the first two controls, you try out the pedals, pressing on the left one. As predicted, the tail moves to the right, the nose turns to the left and the machine automatically banks. Now all doubts leave you and, like a child with a new plaything, you began to experiment with all sorts of combinations: flying forward and down at the same time, sideward and up, backward to the left.

By the time you are ready to come down, you and the helicopter are old friends. You pick out a spot to land, maneuver until you are directly over it, put the stick in "neutral" and push the left-hand lever forward. Approaching the ground, you adjust the lever so as to descend very slowly, and land without even a slight jar. It's as simple as all that.

Because of its simplicity, Sikorsky believes that the helicopter, not the airplane, will be the popular machine of the coming air age. Its convenience, too, makes mass flying practicable. Most airplane owners have to ride miles to the airport by automobile or bus in order to fly their planes. But the average man could keep a helicopter right on his own property, in a hangar just a little larger and higher than a two-car garage. Or, if he lived in the city, he could keep it on his apartment roof. Then, when he wanted to use it, he could fly directly to his destination and back, instead of wasting sometimes as much as two hours on treks to and from airports.

"Free Wheeling" for Safety

Moreover, the helicopter is safe. As the performance of airplanes has improved, their landing and take-off speeds have increased, requiring of the pilot unusually good reflexes and quick decisions. When taking off, the pilot must have a clear mental picture of the trees, telephone poles and houses near the airport, and when landing, he must gauge carefully his height and speed and distance from the airport. Many middle-aged people who could afford a plane are not physically qualified to fly one, whereas they could operate a helicopter perfectly safely. In a helicopter they could take off and land at a speed as slow as one foot a minute. And, since the machine ascends vertically, they would not have to worry about skimming in over trees and wires and other obstacles.

In case of engine failure, Sikorsky has installed a free-wheeling unit between the engine and the rotor. What distinguishes a helicopter from an autogiro is that the rotor of a helicopter is connected directly with the engine and is turned by it. In an autogiro, on the contrary, the rotor is not connected with the engine, but, operating on the principle of a windmill, is turned by the air current which the forward motion of the machine sets up. Sikorsky's free-wheeling unit makes it possible to turn the VS-300 into an autogiro so that it can glide to safety. As soon as the engine stops, the helicopter goes automatically into the normal gliding position. Even if the driver should make a mistake at the moment of landing it would usually cause damage only to the machine and not to him because the forward speed would generally be less than twenty miles per hour.

Low Cost, Maintenance

As for the price of a helicopter, Sikorsky says it will cost about as much as a medium-priced car. Fortunately it has few working parts and is easily adaptable to mass production. It will probably cost less to maintain than an automobile because it will have less wear and get less dirty. It will make from ten to twelve miles on a gallon of gasoline, almost as much as a heavy automobile, and will need servicing approximately every hundred hours, or every 7,000 to 10,000 miles.

In commercial aviation Sikorsky believes that the helicopter will provide a unique "bus service," carrying about fifteen passengers. With no railroad tracks or franchised roads to limit its route, it will be ideal for commuters.

Because of certain inherent characteristics, however, Sikorsky says that the top speed of the average helicopter will probably not be much greater than 140 miles per hour. Therefore, conventional airplanes will undoubtedly carry on all the long-distance transportation of passengers and freight by air.

It is one of life's ironies that, now Sikorsky has produced a successful, simple helicopter, a global war in which air power is emerging as the decisive factor is preventing him from putting it into the hands of the common man. Actually, there are only two civilians in the country licensed to fly a helicopter. Charles L. Morris, engineering test pilot at Vought-Sikorsky, holds license No. 1 for commercial flying. And Sikorsky himself holds license No. 1 for private flying. This license, in appearance much like any other license, is the symbol of the air age of tomorrow.

Today, however, the helicopter is being developed behind closed doors solely as a miltary weapon. The same characteristics which make it ideal for mass flying in peacetime make it valuable for military flying in time of war. At a time when the training of experienced aircraft pilots constitutes one of our greatest problems, the simplicity of the controls will make it possible to train able helicopter pilots in a relatively short space of time. And the helicopter's safety will save many lives during training.

Billion-Dollar Market Seen

For coastal patrol the helicopter has many of the advantages of a blimp, plus even greater maneuverability. Not only could it travel as slowly as desired while on convoy duty or in the search for a submarine; it could move sideward or backward. It could maneuver over a detected sub and hover there, allowing the bombardier time to drop his depth charges accurately. In spite of its small size Mr. Sikorsky thinks it could carry a load of a couple of tons.

Because of its small size it is suitable for other missions which a blimp cannot perform. Used for reconnaissance, the helicopter could fly close to the ground, immune to land obstacles. In dangerous territory it could hide under trees, behind hills or in valleys. It could lower men onto strategic spots, inaccessible by ground. It could rescue men from the water or from mountain crags by hovering over them and raising them up by a rope. The exigencies of battle will undoubtedly assign it many other vital tasks.

Meanwhile, in the engineering department of Vought-Sikorsky, Sikorsky and his associates are working constantly on new improvements. When the helicopter becomes available for general use after the war, the public will receive the benefit of these improvements. Just as the automobile industry boomed after the last war, Mr. Sikorsky predicts that the manufacture, sale and upkeep of the helicopter will become a billion-dollar industry within ten years after this war—by 1955, he suggests. Moreover, he says that the military helicopter, unlike the military plane, is 75 per cent adaptable to commercial use.

There is an apparent discrepancy

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FIGHTER FIXIN'S

(Continued from page 26)

tion and land-moving equipment is as essential as planes to the success of a Squadron, which, like the AVG, was within the bombing range of the enemy. In bases so situated, we could forget about hangers and permanent structures of all sorts. Your base is the first objective of the enemy, and you are bound to be hit there sooner or later. It is just as well to have the vehicles so as not to be there when that happens, to have no buildings to bomb, and adequate provision for making the field landable again. Perhaps this doesn't apply to great European Operational Bases, protected by anti-aircraft and camouflage, but it certainly does apply to air operations under conditions we found and can expect in the Far East.

An important correlary to this is the establishment of satellite fields. These may best be described as small, well-camouflaged fields, near to your base and accessible by a system of communications. Satellite fields are invaluable, when your main field is bombed out completely and emergency landing fields are needed. The lack of satellite fields made our Magwe, Burma, base untenable. And satellite fields are not of much value unless you can camouflage them for safe dispersal of planes.

Under our own improvised system, we were able to dig in and fight the Japs from December, 1941, to March, 1942. During all that time, while the Jap land army moved closer, the AVG maintained air dominance over the area. By that, I do not mean numerical superiority, but the AVG were never beaten out of the air and dished it out in a ratio of about 20 to 1. Chennault's boys fought them as long as they were able to take their P-40's off the field. It was not until the Japanese Land forces were close enough to take our ground crew and supplies that we had to retire.

Crews Developed "Cannibalism"

The motor vehicles, used for ground crew mobility, came in good stead when we finally transferred to our permanent bases at Kunming and Chunking. The maintenance personnel drove the trucks and cars over the Burma Road, just before it was cut off by the Japs. Then they flew their P-40's, some to Magwe, Burma, Lowing and finally to Kunming and Chungking. The road transfer from Burma to China was made without the loss of a man or a machine.

My strong right arm, Teh Chang Koo, set up an inventory system that should have been adopted by the Commission on Aeronautical Affairs and the Chinese Army of Supply. He kept notes in a little book—and remembered much more in his head. But they preferred to let such matters take care of themselves and *hoped* to find the parts when required.

Arne Butteberg, who arrived in China with me, turned out to be a mechanical genius in the field. Give him some baling wire and a rusty file, and he could run a major engine overhaul.

Butteberg, Koo, and I were very anxious to get our hands on an engine that we could use for instruction purposes. We watched the rigorous drill in tactics. We felt sooner or later that there would be a minor accident that would give us an engine. Yes, we were ashamed of our attitude, but it was a fact. Later we got more engines than we could use—often under tragic circumstances.

It was from this that AVG "engine cannibalism" developed. The AVG ground crew became past masters at taking the bits and pieces of five damaged, unflyable P-40's, and putting them together in two or three airworthy fighter craft. Every time we pulled this trick I said a little prayer for American standardization and interchangeability of parts, which, as most of you know, was to be banked on in even early Curtiss-Wright P-40's and Allison C-15 engines.

For the first three months, there were no parts in the area, except for one small shipment. Fortunately, this shipment included one set of major repair tools, which had been thrown in at the last moment due to our urgent pleading with Barnaby of the Spare Parts Department at Indianapolis. For a long time that one set of tools was the only one available for the sub and major overhaul depots, which had been set up in preparation for maintenance.

We had a certain amount of generator drive trouble. The AVG P-40's diverted to China, differed from the standard U. S. Army plane, in that larger generators were installed. The gear train was adversely affected, if the engines did not run smoothly. Engines did not run smoothly in Burma that season, because the 100 per cent humidity affected the ignition system. After exposure to this Turkish bath atmosphere for several hours, moisture formed so heavily on the ignition system that it was impossible to start an

(Continued on page 48)

★ ABILITY

★ PRECISION

★ PRODUCTION

DOLAN AIRCRAFT MANUFACTURING COMPANY

DALLAS, TEXAS

FLAT TOP FINESSE

—Navy Photo.

Uncle Sam is converting many merchantmen to carriers. Here's one of them, the USS CHARGER.

Some say the carrier is obsolete. But while you await something to replace them in this war, here are some of the Navy's reasons for favoring the flat tops. With the latest war pictures.

THE officers huddled in the radio room of the carrier were tense, expectant. Over the receiver, from torpedo planes out on attack, came the garbled clamor of battle—squawks and roars and crackling static, mingled with occasional unintelligible remarks between pilots. Suddenly, loud and rasping, came the excited voice of the squadron leader, "Scratch one flat top," he shouted, "Scratch one flat top." From the listeners in the radio room broke uncontrolled cheering.

The squadron leader's terse report was not only the most colorful but probably the most significant phase of the war at sea to date. For the aircraft carrier has emerged as the most important single weapon of our Navy. Throughout naval history, no type of ship has altered sea warfare so much and so quickly. The most spine-chilling words a sailor can hear these days is, "Enemy carrier sighted."

Coffee in the ready-room at dawn. The "bull horn" booming orders. The roar of scores of motors in the morning air as the pilots await the signal to take off. Planes zooming into the air from the flight deck. This is the pattern of modern warfare at sea.

Carrier Development Traced

It was only logical that the country which invented the airplane itself should also originate the aircraft carrier. In 1911, only eight years after the Wright Brothers had made man's first flight at Kitty Hawk, another pioneer aviator, in a flimsy, kite-like plane, landed and took off from a wooden platform built over the quarterdeck of the U. S. cruiser Pennsylvania. The aircraft carrier was born.

Said a contemporary newspaper account of the historic incident: "It means that the aeroplane is a new element in naval warfare which will have to be reckoned with seriously." This was the Navy's belief, too, and from that date it never stopped developing its new-found weapon. Not until 1919, however, after the press of World War operations had subsided, did the U. S. Navy finally convert the collier Langley into its first flush-deck carrier. It was on the Langley during the middle '20's that actual fly-on and fly-off techniques were pioneered and perfected. It was Navy flyers, too, who developed dive bombing, a full decade before it was employed with such deadly effectiveness by Germany. They also invented the catapult, and perfected the long-range patrol bombers so important in Pacific operations today.

In 1928 the famous Lexington, sunk this year in the Battle of the Coral Sea, was commissioned with her sister ship, the Saratoga. Originally intended as battle cruisers, their design as carriers left much to be desired and modifications have been built into

them since. But they set the example for all the other navies of the world. Later, in the 1930's, came the Ranger, our first ship actually designed as an aircraft carrier, followed by the Yorktown, and Enterprise, incorporating all known improvements of the time. Most recent additions were the Wasp and Hornet. Soon to join the fleet is the Essex, a new class; and also the Independence, small, fast and armored, said to combine some cruiser advantages with plane carrying. On the way is a fleet many, many times this size—the biggest armada of carriers the world has ever seen—an armada that will carry America's airpower to all the oceans and continents of the globe.

Taranto Decided Issue

As World War II began, the place of the aircraft carrier in modern sea warfare was undecided. Indeed, as the months wore on, it appeared that the pattern of naval war was unchanged from 1917. Then came Taranto. Veteran exponents of surface sea power declared it might be an exception and proved nothing; but subsequent actions, following in swift and disastrous succession, proved that the Battle of Taranto lifted the curtain on a new kind of warfare.

The date was November 11, 1940. A carrier force under the command of Admiral Sir Andrew Cunningham caught the Italian Fleet completely asleep in the snug harbor of Taranto. Sending in torpedo planes and bombers, two British aircraft carriers sank three Italian battleships and either sank or put out of commission a number of cruisers and destroyers as well.

From that time on, almost every succeeding battle proved anew the tremendous striking power of the modern carrier and its brood of planes. "Tin fish" from torpedo planes off the Victorious and the Ark Royal crippled the German battleship Bismarck, the mightiest man-of-war afloat, so the British Fleet could close in for the kill. Carriers brought across the broad Pacific the swarm of Japanese planes that wrought such terrible damage at Pearl Harbor. Incidentally, that day proved another advantage of the aircraft carrier; namely, its ability, owing to the long range at which its planes operate, to attack and slip away before its position can be located. American carriers contributed substantially to the success of the brilliantly executed raids on the Gilbert, Marshall and Wake Islands in January, 1942. The Battle of the Coral Sea, the first major set-back for the Japs, was almost entirely a battle of carriers. At the Battle of Midway, American carrier-based planes are credited with the sinking of at least three Japanese carriers. The list is by no means complete, but it proves the role played by the carrier. Furthermore, the actions mentioned above involved only a relatively few ships.

CONVERTED CARRIERS have full complement of 3-inch anti-aircraft batteries. Note asbestos gloves for handling searing-hot shell cases.

LOW-FLYING ATTACKERS are target for 20 mm. Oerlikon guns. Uncle Sam's newest carriers sprout these rapid-fire weapons from scores of angles.

Physically speaking, the aircraft carrier must be considered from two aspects—first as a fighting ship and second as a floating airport.

Carriers Are Agile

As a fighting ship, it is the speediest craft afloat for its size. It is a large ship, averaging 750 feet long by 85 feet wide, yet it can develop up to thirty-five knots, a speed surpassed by only the most modern destroyers. Although top-heavy in appearance, it is astonishingly maneuverable. An officer who had been under attack on board one of our modern carriers in the Coral Sea was describing his sensations some time afterward. "Under full speed, we took a hard right rudder," he said, "and went into a starboard list that must have been 45 degrees. Then we gave her a hard left rudder and completed a full 180 degrees so fast that she just kept the starboard list. We felt like flyers doing an outside loop. I didn't even think it was possible."

Complete Airport Facilities

The modern carrier is armored, but so lightly that it cannot depend on this for protection. Vital sections of the ship, such as the engine rooms and ammunition magazines, are protected from torpedoes by a "belt" of armor; control stations and gun locations also receive special protection. As for armament, the carrier concentrates on anti-aircraft guns, since its greatest menace is the enemy carrier's planes. In addition, one or two main batteries of 5-inch or 8-inch guns are provided. In short, as a fighting ship, the carried depends for protection on a screen of cruisers and destroyers to protect it with anti-aircraft fire and anti-submarine vessels.

Considered as a floating airport, the carrier compares favorably with the most completely equipped airfields on land. The number of planes carried varies with the nationality and age of the ship, but in general the larger complements of American vessels constitute one of their greatest advantages. The American Hornet, for example, had a normal complement of eighty-one planes, with space for over 100. By contrast, England's Ark Royal carried only sixty, and Japan's Syokaku was rated at only forty-five. Regardless of its size, the normal complement of a carrier includes reconnaissance, scout, bombing, and torpedo planes. And in addition to the planes in active use, each ship carries disassembled reserve planes that frequently amount to several times its normal complement. In addition, each carrier is a complete working airdrome, with machinery to effect almost any conceivable repair at sea, and large supply of replacement parts.

Because of its dual nature, the carrier requires more personnel than any other type of warship—about 2,000 or more in all. As a huge fighting ship, it must have a large-sized crew to sail it. The crew is organized internally, as on other vessels, into the Navigation Department, Gunnery Department, Engineering Department, Construction and Repair Department, and Medical and Supply Department. Their job is to operate the aircraft carrier, just as the job of any other crew is to operate its ship, and they are not primarily concerned with flying. It is true, however, that the Commanding Officer, the Executive Officer, and Navigator of aircraft carriers are also naval aviators.

Crews Are Highly Trained

Because a carrier is a floating airport as well as a fighting ship, it must have, in addition to the regular crew, a large number of special personnel. These are members of the Air Department, which is just as integral a part of the ship's organization as the other regular departments.

On board an aircraft carrier, it is not enough for a pilot to know how to fly and fight and bomb well. He must know ships and how to live aboard them. He must know the appearance of his own and enemy warships in intimate detail, so that he can recognize them instantly even though they are only tiny dots thousands of feet below. He must know fleet organization and tactics, so he can determine by aerial observation the strength and make-up of an enemy force, its probable course, and its purpose. He must be able to navigate over vast stretches of open ocean with no landmarks to guide him, accomplish his mission, and navigate back to his tiny floating airport, which may itself have changed course and be hundreds of miles from where he left it. And when he gets there he must know how to land, in response to wig-wagged orders, on its narrow plane-packed deck, which may be pitching and rolling at all angles.

Non-flying personnel of the Air Department are no less highly trained in their own specialties. They include crews for handling planes, fuel squads, plane directors, ordnance men, fire-fighting crews, service and repair men, and others. The operating efficiency of the aircraft carrier as a floating airport depends to a great degree on the ability and skill of these non-flying aviation men, whether they work above decks or below. Take-offs, landings, and plane handling in the restricted space of the flight deck demand split-second co-ordination and perfection of technique. One slip, one accident, one mistake in timing, and the efficiency of a whole operation is impaired. Dodging the whirling propellers of several score of close-packed planes, and avoiding being sucked into their back-wash as the deck rolls and dips, requires an old, experienced hand.

Preparing For Action

Below decks, work the technicians and repair men who keep the fleet of planes in perfect working order. Many were skilled workers in civilian life; almost all have undergone intensive training in Navy schools. Welders, mechanics, aviation ordnance men, aviation machinists—it takes as many trades to run the Air Department of a carrier as are found in a large city.

How, then, does an actual operation take place?

First of all, the massive ship itself must be taken to the point of contemplated operations at the correct time, together with a screening force of cruisers and destroyers, the whole task force working, perhaps in conjunction with other fleet units or with land-based aviation units. This in itself is a highly complex problem.

The evening before the attack is to be launched, the squadron leaders have a conference with the Commanding Officer or the Task Commander. After receiving their own instructions, they call their pilots together and describe the special plan of attack to be used. Certain squadrons of dive bombers and others of torpedo bombers will take off at 0500 hours the next day, they inform the pilots. The direction will be E-N-E, and the objective is about 160 miles away. The planes will maintain a speed of about 250 knots and will proceed to attack two enemy cruisers at anchor in a harbor and destroy certain shore installations. They then outline the fuel and bomb loads that each plane will have.

In the eerie false dawn the next day, the planes to be used are assembled on deck and arranged, according to types, in the order of take-off. Below decks, the pilots are lounging over coffee in the "ready" room, their chatting conversationally about the job ahead and keeping their eyes peeled for any last-minute reports or instructions on the teletype. All that comes over is: WEATHER CLEAR ALL THE WAY. LIGHT CUMULUS AT 6,000 FEET.

Suddenly the ship's bugle sounds "Flight Quarters," and the great ship springs into action, every man on

board proceeding immediately to his station. Each has his own job to do; each knows that the efficiency of the whole depends on him personally. The navigator takes a swift reading, determines the heading and necessary speed. The engineer orders the required power. The plane crews are busy warming up their engines, and the gunners take station at their anti-aircraft and machine guns. Now comes the order for which all have been waiting: "Pilots, man your planes." The pilots stream from the "ready" room and jump to their respective planes, giving them a last-minute check prior to launching.

Navy Confident of Carriers' Role

Over the throaty roar of scores of motors, the "bull horn," the ship's loud speaker, booms out the order of the captain to take off. One by one, in succession and on signal, the planes speed down the deck and zoom into the air, forming immediately into squadrons and circling to gain altitude. When the formation is complete, each squadron commander, following orders by inter-plane phone, proceeds with his squadron E-N-E to the designated objective.

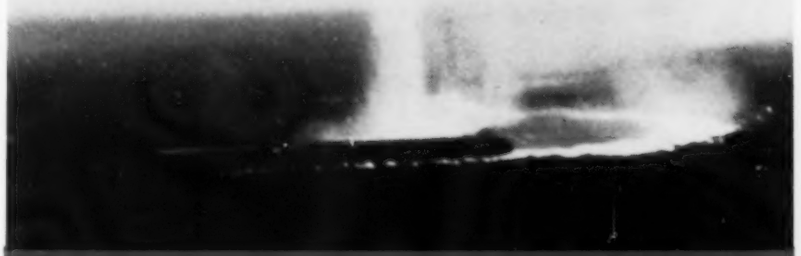
Upon completion of the mission, their bombs, torpedoes and ammunition exhausted, the planes reform and return to the carrier where they form a landing circle. With the same precision with which they took off, they peel off and land on signal wig-wagged by the signal officer. It is no cinch. It involves precision at low speeds and low altitudes—which means a skillful, smooth, steady hand at the controls. The signal officer on deck has the final word as to whether the approaching plane should land or circle and approach again. Only when the movement of the carrier, the wind currents, and the skill of the pilot are all timed together does he wave the pilot on in. Even with the most skillful handling, the landing gears of all Navy planes must be specially reinforced to stand sudden shocks, both of landing and of stopping. For to stop the speeding plane on the carrier deck, a secret arresting device engages a hook under the plane and brings it to an abrupt halt that gives the pilot a sensation not unlike that of a sudden stop in a high-speed elevator.

History will record that in the first year of this war the United States Navy employed its relatively small fleet of carriers with maximum effectiveness. The Japanese have been hit hard, and they will be hit harder. The aircraft carrier has yet to be succeeded by a more effective weapon.

JAP CARRIER ATTACKED

Jap Carrier Swings from Torpedo, but Bombs Jolt It Severely.

FIRST BOMBS DODGED

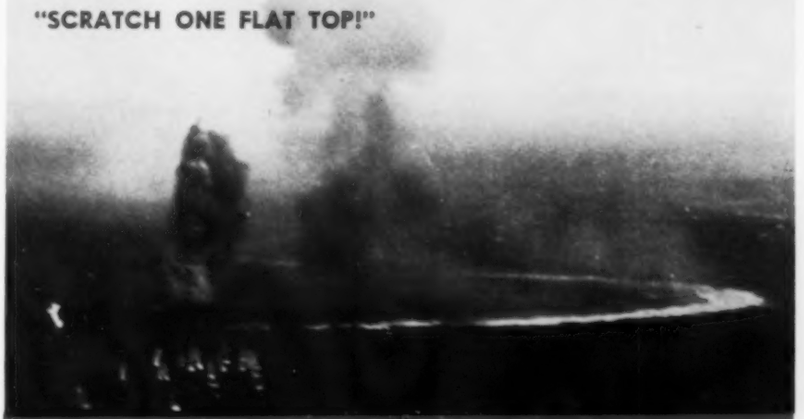


Quick "S" Turn Proves Effective, but Heavy Bombing Inches Closer to Target.

BUT OTHERS FIND MARK

Multiple Bomb Hits Shroud Deck in Smoke, with Flame Shooting From Under Deck.

"SCRATCH ONE FLAT TOP!"



Blaze in Bow Rages on as More Bombs Blow Debris High Into Air. Planes Left Her Ablaze.

FIGHTER FIXIN'S

(Continued from page 43)

engine. This was a natural weather reason, in addition to Japanese attacks, for maintaining our alerts.

Butteberg, Koo and I would hang around like buzzards waiting for a calf to die, hoping to our shame that rough-running engines would make gear trouble, or that there would be some sort of very minor accident. Some events gave the cannibalistic engine buzzards spare parts to repair ships in need of some small part, gear or drive to put them back in service.

Instruction in the Jungle

Now I don't want to be misunderstood in this matter of servicing airplanes and engines without supplies of spare parts. The ground crew checked and double-checked on every part put into an engine. Every man would rather cut off his right arm than endanger the lives of the boys who depended on mechanical perfection upstairs. The fact is that no pilot in the AVG ever lost his life due to engine failure. The AVG ground crew was a loyal and painstaking bunch of lads.

Teh Chang Koo and I laid out an instruction course and, with some misgivings on my part at least, went to work to initiate twenty-two Chinese mechanics in the magic art of servicing electrical propellers and pressure type carburetors, as well as the important points of difference between our Allison engine and the Hispano-Suiza.

In Kunming we gave similar instruction to officers of the Chinese Air Force, attached to aircraft factories, base depots and flying fields. They, in turn, instructed their subordinates.

I am confident that we succeeded in building up a pyramid of trained Allison and Curtiss-Wright P-40 service personnel in China, by these methods, crude as they may seem. If it hadn't been for Koo, I don't know how we would have bridged the gap between English and Chinese.

On this subject of instruction, I would like to say that pilots, if anything, are more difficult to teach than mechanics, American or Chinese. Recently I bought a Sound Scriber for $300—I used it to dictate this paper. I am rather mechanically inclined, but I spent a solid hour going over the instructions before I touched the instrument, and spent several more hours practicing with it. Give a pilot a $70,000 Tomahawk, worth many times that to him in China. He is amazingly indifferent about instructions, even though his life depends on them. For example, new type airplanes, Curtiss-Wright P-40 Kittihawks equipped with new accessories, arrived in Burma. Many pilots were hard put to it to spend more than ten minutes familiarizing themselves with the operation of some new accessory such as the electric fuel booster pump. Results: in several instances fellows did not use the booster pump to pick up gas from another tank and washed out sorely needed fighters. Perhaps it is unfair to compare my $300 Sound Scriber with a $70,000 P-40, my care with the pilot's carelessness. I do not face death when I sit down to a Sound Scriber, but a boy does when he climbs into a fighter plane. However, the fact that pilots are like that presents a very difficult instruction problem. There are good and sufficient reasons for this pilot attitude—the boys are under constant nervous tension; but our training programs should recognize this mental obstacle to instruction.

Observations on Parts Supply

Since I have returned from the Far East I have spent a great deal of time on the question of spare parts. Right now, stocks of aircraft parts are in Egypt, India and China but at times these stocks do not include parts needed immediately to put ships back into the fight.

In China, we found that it was generally the little bits and pieces that grounded airplanes. Parts like distributor points, little screws, distributor fingers, spark-plug insulator tips and the like—small parts such as these gave us the trouble. It wasn't the major parts like crankshafts, pistons, rings and bearings — they always seemed to be available.

For example, we had some trouble with the top distributor shaft bearing. As far as the operating AVG section knew there were none to be found in the country. Teh Chang Koo kept a little inventory book and had a memory as long as your arm. Koo and I found from our records and invoices that there were a quantity of top distributor shaft bearings, scattered over that part of China in five depots. We succeeded in requisitioning these parts and got the ships into the air. Now that part weighed not over two ounces, but the lack of it was enough to immobilize thousands of pounds of perfectly good flyable parts.

This is a matter that SAE members can help to rectify. I realize that the unit ordering of parts is a matter of policy, but it is my contention that the units should be weighed according to incidence of failure.

A large stock of parts is not the answer to efficient field maintenance. It would be better to have a large and varied assortment of the small bits and pieces available to first and second echelon; for these are the parts that are needed to put a plane into action within Chennault's fifteen minutes. These vital first and second echelon parts should receive first priority, and should be flown to the bases where they are needed. The major parts, required by third and fourth echelon for major overhaul, should be provided at longer intervals; also flown to hot spots in emergency.

A careful weighing of unit parts according to incidence of failure, of course, runs counter to the present unit system of setting up arbitrarily the number of parts needed to service an airplane for sixty to 120 days and multiplying that figure by the number of ships in the squadron. Too often the feeling is that parts are so vital that it is just as well to have them on hand though they are overages in certain categories.

This is uneconomical in wartime when every part should be counted in man hours and material.

Another wasteful practice that carries over from peacetime operations under ordinary laws of supply and demand is the practice of ordering 1,000 units, hoping to get 100. When, by chance, the squadron does get the 1,000 units — not the 100 — there is a terrific waste of labor, materials and transportation. Moreover, there is not enough of these critical materials to cover more than actual requirements.

Engineers know pretty well what the incidence of failure is in each of the piece parts of an aircraft engine. Some parts, such as a connecting rod, have practically indefinite life. Other parts, like some of the ones I have mentioned, have an unpredictable life, especially when you run up against some peculiar climatic conditions like the Burmese humidity. It is my opinion that more study should be given to eliminating elements of waste in the unit ordering system, and that certain controls should be established. The individual commander who received 1,000 units when he requires only 100 may be dooming a squadron to certain defeat in another quarter of the globe. A review and analysis of the unit ordering system is particularly urgent now that we are faced with serious shortages of materials.

We Need More Standardization

Another important maintenance question is that of standardization. I have paid tribute to the interchange-

(Continued on page 50)

THE *Sky's the Limit*

BY BILL GREEN

Will the helicopter be practical? . . . Some factors about engineering. . . . Rocket power for conventional planes. . . . Maybe we can overcome gravity. . . . Both battleship and airplanes are right so far. . . . Unified command needed.

Fanciful Thinking

Throughout history there have been certain individuals who have conceived certain ideas—or have been converted to such ideas—and who have jumped in and devoted their lives to trying to get such ideas put over. Lots of such ideas have been wrong from the start. It is not always easy to see just what is wrong or what the trend of things is going to be, but in many cases a small amount of engineering analysis will show the limitations of the idea—before it has gone too far or cost too much.

We have in mind the helicopter and autogiro, as one manifestation. This idea has batted around for about as long as the conventional airplane—and nobody has yet succeeded in popularizng it to any extent. We were sold on it ourselves, about a decade ago, the main argument being that it could take off straight up, almost, and land straight down. It couldn't fall, or spin in, etc. Only, some of them did fall, and various other things happened to them. Of course, that is not to their discredit, completely, because the same thing happened to other forms of aircraft. However, the limitations of the helicopter seem to be pretty well fixed—and there isn't much to be done about it.

In the first place, they must have rather large rotating blades, and these are, of necessity, rather fragile. We have found that the size of engines on normal aircraft must be limited on account of the inability to design propellers able to deliver the power to the air. This inability results from the strength-weight-power ratios required, and the fact that materials of proper characteristics for the required dimensions are not available. In other words, in the design of large propellers, a cross section of material required to withstand the centrifugal forces produced by the rotation of large enough blades to properly transmit the power, would be so great as to be impractical. Many attempts are being made to build large enough paddles and still hold the weight down. Apparently most designers believe it better to use a multiplicity of smaller engines and propellers, rather than try to use one large engine and one large propeller. Other factors enter, such as the diameter of the revolving blades, which, in models developed thus far, is approximately the wing span of normal aircraft. The whirling blades are dangerous, liable to be injured by objects on the ground, and probably could not be made much larger with existing materials.

Existing models are small and therefore limited to hauling only two or three or four persons or a limited amount of other cargo.

Of course, the whole principle is highly desirable. To be able to take off or land on a vacant lot, or one's back yard would be something. Especially when tires and gasoline are rationed it would be a great help to land right where one wanted and to be able to get out of that same place.

The picture, though, in its broad phases, has changed considerably since the war, in that the government has constructed hundreds of wonderful airports, near every town of any consequence, and localities have constructed nice highways directly to such airports. This fact means, then, that suitable landing areas for conventional aircraft, able to haul *large* numbers of persons, and *large* amounts of cargo, *and* suitable servicing and storing facilities are largely existent at most points requiring air services.

The war has shown, however, that we need to revise our ideas and standards for local transportation. The old streetcar systems, in many ways, were more dependable than busses.

There are still a few unexhausted principles which might produce a conventional aircraft able to take off with large loads from a small area.

Although there has been a lot of talk, there have been comparatively few real life experiments on the rocket propulsion and the lift principles as applied to aircraft. The basic principles of rockets, however, are well known, and it does not seem unreasonable to expect that, if suitable fuels and injection apparatus are developed the rocket lift could be applied to conventional aircraft, provided suitable controls or stabilizers of some reasonable size and weight could also be adopted. There are many hazards to be overcome, but these are not any larger than the drawbacks of the current helicopters.

There is always, too, the possibility that someone will learn how to overcome gravity by some sort of neutralization process. The ancients always dreamed of overcoming gravity, but since our lives have become so cluttered up with radios and other mechanical contrivances, very few if any persons have had time to worry about such matters. Nevertheless, it appears that there *should* be some way to neutralize gravity. For example, there is such a thing as neutralizing electric charges, including space charges. There is such a thing as neutralizing magnetic fields. There is such a thing as neutralizing pressure. There is such a thing as *negative* feed back. We think that sometime we might have such a thing as negative gravity.

The whole problem is expressed by Newton's law of universal gravitation, which he put about as follows: "Every body in the universe attracts every other body in the universe, with a force directly proportional to their masses, and indirectly proportional to the distance between them." Find a way to make the airplane unattractive to the earth—and you will have it.

Battleship Versus Airplane

Events of recent weeks have proved that everybody was right about the

old argument as to which is better: The airplane or the battleship. Yes, by all means. They are both right.

There are those rabid exponents of any idea—no matter what—who seem to feel that they must run down all the competition in order to build themselves up. Certainly that has never proved to be a good principle, and usually only proves that the arguments are weak.

Recently we have seen airplanes do yeoman service in Africa, in the South Pacific, and elsewhere. We have not yet seen them take anything, single-handed.

Recently we have seen Naval units do wonderful things. They sank a lot of Jap ships. They prevented some Jap troop landings. They have, with the help of airplanes, aided in the transport of troops and equipment, with an almost unheard-of degree of safety and precision. But they have not, as yet, done anything decisive, in the whole war—not our Navy, nor any other navy. In whatever they have done, they have had help.

Recently our tanks and infantry have done a great deal that was decisive. They have taken and are holding a lot of territory. They, too, had help. From the Navy and from the Air Forces. Also from a lot of folks back home.

The whole idea we are getting back to is this. We are a team. We have to use everything we have—ships, airplanes, submarines, blimps, tanks, walking soldiers with hand grenades and guns, and factory workers and transportation agencies back home. We also need a few bouquets handed to the able taxpayers, who are paying, and will have to pay, the bill. And how!

Finally, when we get right down to it, there is no single agency that has ever done a whole job entirely by itself—not since the first warrior found he could get an advantage by using a club where his adversary had none. We may find that airplanes do some jobs better than battleships. We may find that tanks do *some* jobs better than either airplanes or battleships. And we may find that foot soldiers still have to clean out buildings and caves and other hide outs—and nothing else can do that. Nevertheless, none of them can get close enough to the job to be able to do it without help from all the rest of the services.

About every time we think one of the services is going to completely dominate the war, something else turns up.

To the airplane exponents we have only this to say (and we are airplane exponents, ourselves): When, as, and if any form of transport is developed that will compete with a large surface vessel—for first cost; for operating cost; and for carrying ability—and still go through the air, we'll bet that we will have long white whiskers, and maybe our grandchildren will, too. At any rate, we don't have anything at present that will beat the Naval convoys for getting the heavy equipment and thousands of men over there.

We should be glad we have as much of everything as we do have—and we should never put all our eggs in one basket. Let's continue to develop all forms of transport—and continue to develop our warfare with the thought to fight any and every way that has ever been known, because when you get in the clinches it takes everything, and then some.

Unified Command

What all this dope finally boils down to, is this: Since we have to use some of everything we have for every job we have, why shouldn't it be operated under a unified command? Instead of letting the Army fight on land; letting the Air Force fight in the air (except Naval units); letting the Navy fight on the water, why not plan all operations from one headquarters? Why not have all publicity originate from one headquarters? Why not have one uniform? We have unduly complicated all this business of war, and we are certain that it costs us a lot more because of such complications.

Sometimes we feel that the reason we can't simplify a lot of things is because of individuals—lusty, ambitious, greedy, political individuals. Perhaps some day, when the pendulum swings back from the get-it-easy, spend-it-easy days, we shall simplify our system.

Perhaps we shall even learn enough out of this to have a United States of the World. A "Foreign Legion" police force, honestly and fearlessly operated by the combined nations, could undoubtedly keep international order. Only greedy, dishonest and suspicious people can fail to believe in International Unity.

FIGHTER FIXIN'S

(Continued from page 48)

ability of parts within the limits of one model of an engine, one model of a plane. Unfortunately, I found that principle did not apply from one model to another. For example—and you will find this hard to believe—the P-40 oxygen bottles measured a foot and a half high and about ten inches in diameter; the Brewster Buffalo oxygen bottles, two feet long and fourteen inches in diameter. That might have been all right except for the fact connector lines in the plane, connector lines for refilling, from base supply bottles, were different. It was impossible, therefore, to interchange oxygen bottles from one type plane to another or refill ours. During and between air raids we had to make adaptors by hand.

Another example, a Tomahawk pilot could not communicate with a Buffalo pilot, because their radios operated on different frequencies.

Now I realize that the AVG used a lot of early stuff and maybe some of these examples of lack of elementary standardization do not mean anything today. But I think it is just as well to adopt the slogan—"Don't build for your ally what you cannot use yourself in an emergency."

To sum up, my experience with AVG maintenance, points to the importance of the following:

1. Centralized handling of supplies.
2. Multiple communications.
3. Emphasis on mobility of ground crew rather than the building of hangars and other buildings.
4. Adequate earth-moving equipment on bases within the range of enemy bombers.
5. The necessity of establishing satellite fields and providing for their camouflage.
6. Restudy of the unit system of ordering parts to increase efficiency of first and second maintenance echelons and to conserve labor and materials.
7. Further promotion of standardization of aircraft not already of types used by American forces, but those supplied to our allies.

In conclusion, I would like to point out one very important fact about the AVG which reflects credit on the ground crew. Under ordinary peacetime conditions, the United States Army Air Forces assigns from 1,100 to 1,200 men to 100 pursuit planes. At no time were there more than 270 men in the AVG, and many of them were assigned to clerical jobs necessary to running a self-contained unit.

I don't mean to draw any unfair comparisons between the manning of the AVG and a typical Army pursuit unit. It must be recognized that any Army unit includes a number of novices, and that, as I have emphasized, all of the men in the AVG were experienced Army, Navy and Marine personnel. Nevertheless, the average ground crew man did the work of four.

"WELL GROUNDED" PILOTS FLY BEST

AMERICANS are the most mechanically minded people on earth! Coordinate this native mechanical ability with thorough flight training and the world's best pilots result. That's the calibre of airmen being turned out for our Army Air Forces at Ryan Schools in California and Arizona. Because true airmanship combines a mastery of basic mechanics with flying technique, ample emphasis is given ground instruction for all Army cadets. If you want to join this selected group of U. S. Army Air Force pilots, who *know* planes as well as fly them, visit your nearest recruiting office today.

RYAN

RYAN SCHOOL OF AERONAUTICS
Headquarters, San Diego, California

"RYAN IS A GOOD PLACE TO TRAIN AND A GOOD PLACE TO WORK"

. . . says Harry Raine, technical instructor at Hemet. He was chosen by his fellow ground school instructors to express their determined attitude in their all-out war work at the Ryan School of Aeronautics.

RYAN SCHOOL OF AERONAUTICS, Hemet, Calif. • *RYAN SCHOOL OF AERONAUTICS of Arizona, Tucson, Ariz.*

DEDICATED FOR THE DURATION TO THE EXCLUSIVE TRAINING OF ARMY PILOTS

There are several ways to look at priorities, says this supplier of aircraft parts and accessories. If you have pondered the red tape and cussed the empty stock bins, you'll be interested in knowing the facts about the situation. Here they are, from one who is familiar with both sides of the matter.

PRIORITIES

and the Private Pilot

Editor's Note: The whole idea of priorities is based on the fact that there are not enough materials and supplies available to fill the needs of all military and normal consumers. Thus, in order to insure that military requirements are met first, and essential civilian requirements next, a system of priority ratings has been set up. While this system has been continuously revised, and ways and means have been changed, it is working as well as can be expected all things considered. The following article should be helpful to the average airplane owner and fixed base operator. Additional information may be obtained from your local War Production Board office.

By R. B. KENTY

I BELIEVE that every supply depot, factory, flying school operator, Civil Air Patrol base and private plane owner will agree it is becoming increasingly difficult to procure the necessary parts and accessories to build and maintain airplanes. Due to the increasingly large number of planes being built and the correspondingly large quantities being flown and maintained every day, it is only natural that there should be a shortage of readily available aviation supplies. This being the case, it behooves everyone in the industry to make the best of what is available and to take every advantage of the various means at his disposal to obtain the essential supplies necessary for the manufacture or operation of his aircraft.

Priorities, of course, play a most important part in the procurement program. In this regard the aircraft factories have the biggest advantage in being granted high blanket priorities of AA-1 and even higher for those supplies to be incorporated in their finished product. Equally fortunate are the many Army Air Corps training schools operated by civilian contractors and the airlines operating under the Air Transport Command. Unfortunately, CPT and CAP have not been blessed with sufficiently high blanket priorities to enable them to obtain maintenance supplies in the quantities always required or within the time desired. In fact, the War Production Board orders do not provide a blanket rating higher than A-10 for the maintenance of CPT and CAP planes.

CAA and CPT Need AA-1

It is true, however, that the CAA recognized the hardships this low priority rating was working on the CPT operators and accordingly through Special Memo No. 125, dated September 4, 1942, lent assistance by granting A-1-A priorities on rationed quantities of certain critical supplies. This should not be construed as a blanket A-1-A rating though it was a short-cut over the old method of filing a PD-1A and waiting approximately three weeks for a rating.

While on this subject of priorities for CPT and CAP it is well to mention another plan suggested by the War Production Board in a memorandum dated July 29, 1942, to all CPT and CAP operators. The theory of their plan was to place proper quantities of necessary aviation supplies in the hands of distributors so that they would be available when needed by CAP and CPT. The distributor did this by forwarding form PD-1X (distributor application for preference rating) to Washington, where a sufficiently high rating was assigned to obtain the parts listed on the application. In other words, the distributors PD-1X served him the same purpose as the consumer's PD-1A and took the same time for execution; namely, three weeks. It was further explained in the memo mentioned above that preference ratings were not needed when sales were made by distributors to operators under CPT and CAP.

This, however, is contradictory to restrictions placed on the distributors when granted a rating on form PD-1X. For instance, we just received an A-1-A rating on a PD-1X to purchase 25,000 feet of badly needed aircraft control cable, but we were instructed to sell this cable on

(Continued on page 54)

It took FIFTEEN YEARS to build our World Routes, now so vital to Victory

Every American knows the story of Lewis and Clark—the men who pioneered a trail across the North American continent to the Pacific.

But few Americans know the story of how Pan American Airways—our Merchant Marine of the Air—pioneered skyways across two oceans and down the length of South America in the short space of fifteen years.

In Central and South America, cloud-piercing mountains, hundred-mile swamps and deadly jungles blocked the path. For much of the territory, no accurate maps existed . . . None had been made since the 17th-century charts of the Spanish, Dutch and French explorers.

To equip some of our early airports on the route to the Panama Canal, gasoline had to be carried in *by hand*—long lines of natives, each with a five-gallon tin balanced on his head.

In the Pacific, at Midway and Wake Islands, there were no harbors . . . Construction materials had to be towed through heavy seas, floated over barrier reefs and landed on the beach despite the heavy breakers.

Across Africa also, airports had to be hacked out of jungles and built up on desert wastes. At some points the only available hauling power was furnished by camels . . . Native Africans who had never seen an airplane were employed as artisans.

In Alaska, summer is brief—roads did not exist. Airports had to be built on unfriendly swamp morass or, when it was available, on glacial gravel and sand.

* * *

Today all these routes are playing their part in hastening Victory for the United Nations.

Without exaggeration, it can be said that the existence of facilities pioneered by Pan American has saved the United Nations' aerial war transport many long months.

Wings over the WORLD

PAN AMERICAN CLIPPERS

PRIORITIES AND THE PRIVATE PILOT

(Continued from page 52)

rated orders only and told that if we did not we would be refused any further applications for this item. On another rating just received for 2,500 feet of shielded ignition cable we were informed that an A-1-J rating was the best possible assistance that could be rendered CPT and CAP on unrated orders. It was therefore recommended that we sell critical materials to CPT and CAP on rated orders only.

From this we all can readily understand the urgent need for an AA-1 blanket priority for CAP and CPT. If this cannot be obtained the only alternative is to file a PD-1A each time a high rating is required to obtain some critical part or apply to your regional CAA headquarters for assistance if it is on the rationed list of critical materials listed in Special Memo No. 125 to all CPT contractors.

Available Stocks Described

I would lke to add here that it is mandatory under priority regulations that shipments be made against any rated orders received, provided, of course, that the materials are in stock and not frozen. It is therefore unlawful to refuse to make shipment against any rated order be it even A-10, no matter how badly the supplier might want to retain that material to stock. If the materials desired are not in stock, the distributor must have a sufficiently high rating granted him to obtain them from the factories in case very high ratings are required.

Perhaps by now you are wondering what advantage there is in having a high priority rating if the parts you need are not available. You are also wondering just how scarce are these aviation supplies. In the last week I have visited three other aviation supply houses in various parts of the country and on the whole I would say stocks are ample but spotty. By that I mean there was plenty of some critical items and none of others, but the percentage of available items far exceeded those that were not available. I am speaking primarily now of small quantities for maintenance of aircraft and not huge inventories available for factory production.

I'll mention a few of the critical items that all supply houses have difficulty in obtaining: brass safety wire, copper tubing, brass pipe fittings, aluminum sheet and tubing, steel sheet and tubing, steel control cable, ignition wire and miscellaneous items of aircraft hardware.

What's Happened to Gasoline?

If you're a private pilot, you've probably done your share of complaining over the gasoline situation, accusing the supplier of selling an inferior quality which provides less power and cuts down your RPM. You're positive about this. But the Aero Insurance Underwriters say it isn't nearly as awful as all that. According to them, the facts are these:

The only **actual** change in your gasoline is in the increased tetraethyl lead content. You used to burn clear gas of 73 octance quality. But since January 1, 1942, the government has required that all gas not for military use be blended from a base of 65 to 67 octane. So, by governmental order, the oil and gas companies now blend 1cc of lead to serve you what used to be 73 clear; 80 and above has 2 cc of lead and from 90 to 100 now contains 3 to 4 cc of tetraethyl. In addition, a trace of organic dye was added, to identify each octane rating with a different color.

All this has been found by actual tests to leave the pre-1942 characteristics unchanged, say the Underwriters, and performance should be identical as far as power output, carburetion and idling are concerned.

But—

The added tetraethyl has greatly increased the amount of lead deposit affecting valves, valve seats, guides and the combustion chamber. And accumulation means more maintenance for your engine. Otherwise, power and RPM will obviously fall off, and heat will build up a knock. Moreover, the accumulation of lead will burn spark plugs more rapidly.

So, says our informant, it is a matter of maintenance—or more frequent top overhauls.

Items that still seem to to be plentiful include dopes and thinners, fabric, windshield materials, gas and oil hose, tires and tubes, plywoods, propellers, spark plugs, shock cord, brake fluids, and all sorts of pilots' personal needs.

The stocks of all items fluctuate greatly. Your aviation supply house may have a large stock today and none tomorrow or just the reverse might be true.

How You Can Help

Prior to the war it was the general policy of practically all supply houses to back-order any item that was not available at the time the original order was received and ship it at some future date. However, today, due to high priorities required on many items, the minimum requirements of some manufacturers, and extended delivery dates, it has become necessary to cancel the back orders on many items and offer substitutes or recommend some other logical source of supply. This at least gives the customer something definite to work on and permits him to take decisive action at once instead of weeks or months later when we find it might be impossible to obtain the back-ordered items.

I believe the following rules will help in making it possible for your distributor to supply your needs more completely and promptly:

1. Forward priority rating with every order.
2. Anticipate your needs as far in advance as possible.
3. Authorize any reasonable substitute.
4. Use purchase order numbers.
5. Keep copy of all orders issued.
6. Reorder on future orders items cancelled on previous orders for lack of stock.
7. Refer to suppliers catalog for correct AN numbers and descriptions.
8. Visit your supplier if you have the opportunity.

Remember, too, that your distributor has to struggle with priorities and other regulations and restrictions that make it impossible for him to render the same prompt, efficient service to which you were accustomed in the past. Multiply your procurement problems by several hundred and you have some idea of the headaches confronting your aviation parts distributor. However, this does not alter the fact that he possesses the same earnest desire to serve your needs to the very best of his ability.

Try to understand his problems as well as you expect him to understand yours, because we must work and pull together to make the most of the limited supplies available.

The eyes of all America are upon the United States Treasury Roll of Honor appearing in the "Payroll Savings News." For copy write War Savings Staff, Treasury Department, Washington, D. C.

HOW TO "TOP THAT 10% BY NEW YEAR'S"

Out of the 13 labor-management conferences sponsored by the National Committee for Payroll Savings and conducted by the Treasury Department throughout the Nation has come this formula for reaching the 10% of gross payroll War Bond objective:

1. ***Decide to get 10%.***
   It has been the Treasury experience wherever management and labor have gotten together and decided the job could be done, the job was done.
2. ***Get a committee of labor and management to work out details for solicitation.***
   a. They, in turn, will appoint captain-leaders or chairmen who will be responsible for actual solicitation of no more than 10 workers.
   b. A card should be prepared for each and every worker with his name on it.
   c. An estimate should be made of the possible amount each worker can set aside so that an "over-all" of 10% is achieved. Some may not be able to set aside 10%, others can save more.
3. ***Set aside a date to start the drive.***
4. ***There should be little or no time between the announcement of the drive and the drive itself.***
   The drive should last not over 1 week.
5. The opening of the drive may be through a talk, a rally, or just a plain announcement in each department.
6. Schedule competition between departments; show progress charts daily.
7. Set as a goal the Treasury flag with a "T."

AS of today, more than 20,000 firms of all sizes have reached the "Honor Roll" goal of at least 10% of the gross payroll in War Bonds. This is a glorious testimony to the voluntary American way of facing emergencies.

But there is still more to be done. By January 1st, 1943, the Treasury hopes to raise participation from the present total of around 20,000,000 employees investing an average of 8% of earnings to over 30,000,000 investing an average of at least 10% of earnings in War Bonds.

You are urged to set your own sights accordingly and to do all in your power to start the new year on the Roll of Honor, to give War Bonds for bonuses, and to purchase up to the limit, both personally and as a company, of Series F and G Bonds. (Remember that the new limitation of purchases of F and G Bonds in any one calendar year has been increased from $50,000 to $100,000.)

TIME IS SHORT. Our country is counting on you to—

"TOP THAT 10% BY NEW YEAR'S"

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with

War Savings Bonds

This space is a Contribution to America's All-Out War Effort by SOUTHERN FLIGHT

Reorganization of Aero Chamber is Postponed

Proposals for the reorganization of the Aeronautical Chamber of Commerce, scheduled for consideration at the annual meeting December 3 in New York, will not be taken up until January 22. Senior Vice President Robert P. Newton said a special committee assigned to the task had not completed its recommendations for perfecting the new organization. Edgar N. Gott, vice president of Consolidated Aircraft, is chairman of the special committee, whose members include representatives of Boeing, Bendix, Douglas, United and other companies.

Selection of a successor to Col. John H. Jouett, who resigned to accept the vice presidency of Higgins Aircraft, Inc., of New Orleans, was understood to have been delayed pending clarification of the reorganization plan.

Stick Randall, Manager of Eastern Air Council

I. S. "Stick" Randall, assistant to the chairman of the board of TWA, has assumed duties as general manager of the newly-formed Aircraft War Production Council, East Coast, Inc., with President Guy W. Vaughan declaring Randall will correlate the Council's activities for eight eastern aircraft firms. Randall won many friends for aviation during a recent speaking tour of the country. He formerly was president of the Sales Executives Club and the Advertising Club of New York.

Automotive Leader Cites Aircrafters' Accomplishments

The dollar value of aircraft production for 1942 will be equal to the highest annual dollar value of automotive production, George Romney, managnig director of the Automotive Council for War Production, said recently. He added that fifty per cent more employes are now directly engaged in aircraft production than were normally engaged directly in automotive production.

U. S. Questionnaires Are Being Simplified

Business men are to have a hand in framing questionnaires which they have to fill out for the government, says the U. S. Chamber of Commerce. The government has come to realize the burden which reporting procedures imposes and it has been moving by progressive steps to reduce it. Already some seventy forms have been eliminated and others have been simplified.

After January 1, no business organization will be required to reply to any government questionnaire which does not bear the Bureau of the Budget's designation. This does not apply to forms received between now and January 1, 1943, the Chamber said.

Birmingham Gets Modification Center

An auspicious announcement has been made by John A. McCone, president of the Bechtel-McCone-Parsons Corporation of Los Angeles, of another important aircraft venture for the South—construction at Birmingham of a $12,500,000 plant "to equip Army combat planes for servcie."

"This will be the largest facility of its type in the United States and will have a capacity to handle several times the output of other similar plants located throughout the country," said McCone, who is also executive vice president of the California Shipbuilding Corporation.

The operation will be located on a 260-acre site adjoining the Birmingham municipal airport and will employ more than 15,000 workers when its activities reach full operation.

UNSKILLED LABOR easily operates Scott Aviation's new semi-automatic jig for bending high-pressure copper tubing for aircraft. Two operations of a roller on simple wooden dies is all that's necessary to produce accurately-shaped tubing ready for soldering.

Air Cargo Technicians Organize to Promote Efficiency in Global Freight Operations

Thirty-three per cent of air cargo space is now wasted because of faulty loading and packaging, says the Air Cargo Research Association, a group of technicians formed at Los Angeles to "prepare aircraft builders and the American shipping industry for global air transport." A five-point program has been adopted to promote more efficient loading and unloading of aircraft, standardized packaging, use of better lifting devices, stowage methods and plant-to-warehouse transport, and to develop new designs and fittings for airplane interiors for freight.

Thomas Wolfe, vice president of traffic for Western Air Lines, was named general chairman of the research association, with other officers as follows: James F. Hall, shipping coordinator for North American Aviation, Inc., first vice chairman; Gordon Brown, manager of contract administration, cargo and transport aircraft for the Douglas Aircraft Company, second vice chairman; Jack B. Sheehan, manager of industrial research for the Lockheed Aircraft Corporation, secretary; and William A. Lippman, treasurer.

Committees set up and chairmen named were: Statistics and Research—Ralph E. Oursler of the industrial research department, Lockheed Aircraft Corporation; Container and Package Specifications—Robert Welliver, loading engineer for the Douglas Aircraft Company; Engineering and Transportation—Robert Reedy, chief of preliminary design engineering for the Vega Aircraft Corporation; Organization—Kenneth L. Vore, assistant traffic manager of Vultee Aircraft, Inc.; Public Relations—Glen B. Eastburn, manager of the aviation department of the Los Angeles Chamber of Commerce.

HUGE SELF-SEALING fuel tanks are produced in growing numbers by the U. S. Rubber Company. The big cells at top are carefully fabricated and then (lower photo) are baked in gas ovens.

Trainer Output Surveyed

Production of trainer planes has not curtailed the output of fighters and bombers, an Aeronautical Chamber of Commerce survey has shown. Firms manufacturing training planes are Aeronca, Boeing, Beech, Cessna, Curtiss, Fairchild, Fleetwings, Howard, North American, Piper, Ryan, Taylorcraft, Vultee and Waco. Makes by other firms are also used as trainers.

Official records show that during a seven-months period this year, 45 per cent more hours of training were flown than in ten years prior to 1940. Yet, says the Aero Chamber, the accident rate was lower.

Wilson Primed to Double Plane Output

Donald M. Nelson, War Production Board chief, has ordered aircraft production doubled within a year. He announced his plan after installing Charles E. Wilson as vice chairman of WPB and "czar" of aircraft production.

Emphasis will continue to be on heavy bombers, and Wilson will have jurisdiction over all government agencies dealing with aircraft, presiding over a "little WPB for aircraft."

West Coast Firms List Their Military Models

Following are the principal present production planes and previously built military aircraft still in service, listed by firm for member companies of the Aircraft War Production Council:

CONSOLIDATED AIRCRAFT CORP.

B-24 (Liberator) Four-engine long-range heavy bomber.
C-87 (Cargo version of B-24) Four-engine cargo plane.
PBY (Catalina) Twin-engine Navy Patrol boat.
PB2Y-3 (Coronado) Four-engine Navy Patrol Bomber, also built with modifications for cargo-carrying purposes.

DOUGLAS AIRCRAFT CO.

C-47 (Sky Train) Twin-engine transport and cargo; military version of DC-3 airliner.
C-53 (Sky Trooper) Similar to C-47, designed primarily for light cargo.
C-54 (Sky Master) Four-engine heavy cargo plane.
DC-5 Twin-engine transport and cargo.
TBD (Devastator) Single-engine torpedo bomber.
SBD (Dauntless) Single-engine dive bomber.
A-24 (Banshee) Single-engine dive bomber; Army version of Navy SBD.
A-20 (Havoc) AAF Twin-engine medium bomber.
DB-7 (Boston) RAF Twin-engine medium bomber, similar to A-20. (Use of terms Boston and Havoc have been used for both planes, but AAF and RAF recently agreed to follow the above names.)
B-19 Four-engine heavy bomber, World's largest land plane. Experimental.
B-18 (Bolo) Twin-engine reconnaissance bomber. Service derivation of DC-3 airliner.
B-23 Recent development of B-18.
B-17 (Flying Fortress) Four-engine heavy bomber, built under license from Boeing.
B-24 (Liberator) Four-engine heavy bomber, built under license from Consolidated.

LOCKHEED AIRCRAFT CORP.

AT-18, A-28, A-29 (Hudson) Twin-engine medium bomber and reconnaissance plane. Familiarly known to Britain as "Old Boomerang."
18 (Firm model number) (Lodestar) Twin-engine transport.
C-56, C-57, C-59, C-60 Military Versions of Lodestar. Cargo.
P-38 (Lightning) Twin-engine, high speed interceptor fighter.
C-69 (Constellation) Large four-engine transport and cargo plane; still under construction.

NORTH AMERICAN AVIATION, Inc.

P-51 (Mustang) Single-engine, high speed fighter.
B-25 (Mitchell) Twin-engine medium bomber. (First plane to raid Tokyo.)
AT-6A (Navy SNJ) (Harvard) Single-engine advance trainer.
BT-14 Single-engine basic trainer.
BT-9 Single-engine basic trainer.
BC-1 Single-engine basic combat trainer.
O-47 Single-engine, three-place observation plane.

NORTHROP AIRCRAFT, Inc.

N-3PB Single-engine patrol bomber seaplane.
Flying Wing Tailless experimental plane—Twin-engine.
A-31 (RAF-V-72) (Vengeance) Single-engine dive bomber built under license from Vultee.

RYAN AERONAUTICAL CO.

SOR-1 Single-engine Scout Observation for Navy under license by Curtiss.
YO-51 (Dragonfly) Single-engine Army cooperation plane.
PT-21, PT-22 (Navy NR-1) Single-engine trainer.
PT-25 Single-engine plywood trainer.
STM Single-engine trainer of PT-22 class, British version.
SC Single-engine sport plane, three-place; widely used by Civilian Air Patrol.

VEGA AIRCRAFT CORP.

B-34 (Ventura) Twin-engine medium bomber and reconnaissance plane; modified version of Lockheed Hudson.
B-17 (Flying Fortress) Four-engine heavy bomber, built under license from Boeing.

VULTEE AIRCRAFT, Inc.

P-66 (Vanguard) Single-engine fighter.
BT-13A, BT-15 (Navy SNV-1) (Valiant) Single-engine basic trainer.
A-31 (RAF V-72) (Vengeance) Single-engine dive bomber.
O-49 (Vigilant) Single-engine Army liaison plane.
V-11, V-12 Single-engine transport planes, converted by South American countries and now used as attack bombers.

THE U. S. ARMY AIR FORCES' newest transport is this new C-78, developed by the Cessna Aircraft Company. Constructed largely of plywood and fabric around a welded steel tubing fuselage.

Eighteen Hours' Riveting Finished in Seven and One-half Hours

A team of riveters at Brewster Aeronautical Corporation's Newark Division smashed production records in completing a rush order for bomber wings, finishing in seven and one-half hours what would have ordinarily taken more than eighteen hours to accomplish.

In less than two hours the pace-setters had completed four full outer panels manufactured by Brewster for the Consolidated PBY flying boats. After inspection yielded 2 per cent rejections, riveters went to work again and finished the entire job in seven and one-half hours.

Many "Firsts" Claimed For Pace-Setting C-87

When Wendell Willkie completed his recent globe-circling journey in the "Gulliver," the first C-87 four-engined cargo plane built in the Texas plant of Consolidated Aircraft, the huge transport had distinguished itself in several ways. It was: First to make a round-the-world air passenger trip via the North Pacific; first to fly from China to the United States via Alaska; first American craft to span the Gobi desert and the Mongolian Republic; and first American plane to fly through Siberia in wartime. In addition the C-87 gave the Shah of Iran his first airplane ride—on the first anniversary of his reign.

Lockheed-Vega on Radio

On November 9, Orson Welles launched the first of a series of Lockheed-Vega radio shows, dealing with the personalities, planes and dramatic events of the aircraft industry.

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The Rationing of Gas and Tires Will Not Affect Our Service to the Nation's Vital Aircraft Industry

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FAIRFAX AIRPORT Kansas City, Kan.

Vultee's Nashville Plant Boosts Dive Bomber Output

The only completely mechanized overhead assembly conveyor line of its kind in the industry has speeded up the production of new A-31 Vengeance dive bombers at the Nashville plant of Vultee. The newest feature of the A-31 is its secret hydraulically-controlled dive brakes. The plane is powered by a 1,600-h. p. Wright double Cyclone and has an unusually long range with a 2,000-pound bomb load. Crew and vulnerable areas are armor plated.

Overhead Conveyors Feed NAA'S Texas Assembly Line

Fred E. Link, methods engineer of the Texas plant of North American Aviation, Inc., has perfected two overhead conveyors to provide a smooth flow of materials and parts to final assembly lines. One, operating from the G. F. E. stores, transports such items as tires, wheel struts, radio and the like at twenty-five feet per minute, with controls located at five major stations. The other forms a loop through the sheet metal departments and carries parts through various fabrication stages, including heat treating.

Pratt & Whitney Pool Boosting Engine Output

Six licensees are turning out a constantly-increasing volume of Pratt & Whitney engines in a vast United Aircraft co-operative. They are Ford at Detroit, Buick at Chicago, Chevrolet at Tonawanda, N. Y., Nash-Kelvinator at Kenosha, Wis., Jacobs at Pottsdam, N. Y., and Continental at Muskegon, Mich., all of which are licensed at only $1 per engine.

Success of the project has depended on hundreds of exchanges of "know-how", parts and machines back and forth between P & W and the licensees. In one instance, machine tools weighing as much as five tons were pulled out of the East Hartford, Conn., production line and trucked to a Mid-Western licensee when tool makers were unable to deliver on time, and the P & W lines were rearranged so there would be no drop in production. One licensee reciprocated by rushing 20,000 cylinder heads to East Hartford.

Scott Awarded "E"

The Scott Aviation Corporation at Lancaster, New York, has received the joint Army-Navy "E" for outstanding accomplishment in the production of war materials.

STEEL RULE Dies SINCE 1900

SPEED AND ECONOMY

We Are Making Dies for Many of the Leading Airplane Plants.

For Cutting Everything — Even Wood

J. A. Richards Co. Kalamazoo, Michigan

Jouett to Address Texas SAE Meeting

Colonel John H. Jouett, vice president of Higgins Aircraft, Inc., of New Orleans, has been scheduled as the principal speaker of the January 14 meeting of the Texas Section, according to Allen Guiberson, chairman, who conferred with Col. Jouett in New Orleans, where the new firm will build 1,200 plywood models of the Curtiss Commando transport.

At the November meeting of the Section, Don Marshall, Southwestern manager of the Lockheed Aircraft Corporation, conducted a special program highlighted by an off-the-record discussion of Lockheed's winterization project for the Army Air Forces. Robert C. Pote, engineering supervisor for the project, was speaker, and Roy Dickson, a Lockheed test pilot who formerly operated with the Star Air Line in Alaska, showed color movies of flight operations in the Far North in temperatures as low as 65 degrees below zero. A guest was Bert Hall, last survivor of the original Lafayetter Escadrille and soldier of fortune who once commanded the National Chinese Government's Air Force.

The Section named Guiberson as a member of the national sections committee and nominated Dr. Howard Barlow, head of aeronautical engineering at Texas A. & M. College, as delegate to the national elections committee, with S. V. Jay as alternate. Vice Chairman Harold Schwedes, manager of North American Aviation's Texas factory, presided.

BOOKS

The Man Behind The Flight, *by Assen Jordanoff, published by Harper & Brothers, 49 East 33rd St., New York City, 276 pages, price $3.50.*

Written by an "ace" of aviation writers with a unique ability to simplify complex subjects, this book should be very helpful to the men who are building and servicing our airplanes, and to the thousands of young men who plan to enter this important field of work in the future. Pilots, too, will have a better understanding of the planes they fly if they master the fundamental information so clearly given in "The Man Behind the Flight".

More than 300 scientifically exact drawings and a clearly worded, precise text show you how to read the mechanical drawings and blueprints easily and accurately, and provide you with the information you need to know about physics, mechanics, hydraulics, and electricity.

The book also contains a compact history of aviation which includes 31 pages of photographs.

★ ★ ★

Meteorology, *by W. J. D. Allan and William Alexander, published by The Chemical Publishing Co., 234 King Street, Brooklyn, N. Y., 110 pages, price $1.50.*

This latest book in the Observer's Handbook series is written by the authors of the first two books in the series—that on Maps, Charts and Projections, and that on Dead Reckoning Navigation. Illustrated with a number of diagrams and charts, the book takes up the cause of changing weather conditions, and is intended to assist aviators in general to avoid or counteract the many dangers which befall them through weather conditions.

★ ★ ★

The Ohio Crankshaft Co., *3800 Harvard Ave., Cleveland, Ohio,* developers of the TOCCO process of induction heating, has released a new comprehensive booklet entitled, "Faster Production With TOCCO". The sixteen-page, bulletin-sized booklet describes TOCCO operating principles in hardening, brazing, annealing and heating metal. The heat-treating applications explained have made it possible for many manufacturers of metal war materials to beat production schedules, according to W. W. Benninghoff, manager of the TOCCO division of the company.

★ ★ ★

Latching Relay

The Allied Control Company recently introduced their newly perfected BJU Aircraft Relay, unique in that it locks mechanically in either position so that only momentary current needs to be applied to the coils. Other factors include: four-pole, doube-throw, maximum rating five amps. per contact—non-inductive, available for AC or DC, weight seven ounces, size one and thirteen-sixteenths by five-sixteenths by two inches and they meet every Army, Navy or CAA specification.

★ ★ ★

Fellowship Established

An industrial fellowship has been established in the Mellon Institute at Pittsburgh by the Hawley Products Company of St. Charles, Ill., manufacturer of molded cellulosic and allied plastic products, for the purpose of conducting an investigational program. Dr. J. C. Williams, specialist in cellulose chemistry and plastic technology, has been appointed to the incumbency of the fellowship and will be assisted by Peter Shanta, a University of Pittsburgh chemical engineer. They will have the co-operative aid of experts in the Institute and in the Hawley Company.

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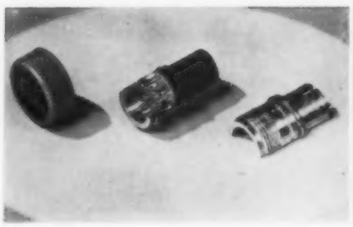

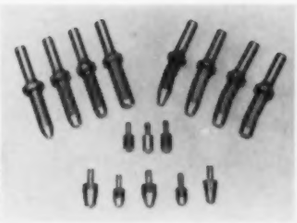

New Three-Piece Cable Connector

A new electrical cable connector that eliminates one coupling nut and one barrel, providing a three-piece split-shell construction, is in production by the Harwood Company, Los Angeles. Assembly and maintenance are speeded by this lighter, more simplified construction, and greater speed of installation gives consequent saving in time and cost of installation. Entirely of die-cast construction, the connector conforms in all respects to Army-Navy specifications, say the manufacturer. A complete range of sizes is available.

Versatile Jig Clamp Perfected

Carrying the name "Pec", a new line of self-adjusting jig clamps that can be locked in infinite positions up to fifteen degrees above or below horizontal is announced by Products Engineering Corporation, Los Angeles. A slotted aperture functioning much like that on a pair of pliers, makes the adjustments possible. Use of the clamp will make it possible to carry a much smaller stock of jig clamps as it is said to do the work of several. The clamp also has a positive lock. It is of drop-forged construction and is available in numerous types.

Complete Line Of Rivets

Aircraft Tools, Inc., has broadened their line of Aerocraft Rivet Sets to include practically every known type used in aviation. The list now includes all standard sizes of the straight type round head, brazier head, flat head and modified brazier head from 3/32-inch to ¼-inch diameter; offset type rivet sets with round head, brazier head, flat and modified brazier head from 3/32-inch to ¼-inch diameter; swivel type flush rivet sets, straight flush rivet sets with 1¼-inch heads, and hand rivet squeezer sets in 3/32-inch, ⅛-inch, 5/32-inch and 3/16-inch round and brazier heads.

Plastic Seat For Aircraft

Said to be the first of its kind, a new Plasti-Seat for trainer, fighter and bomber planes has just been perfected by the Harvill Corporation through use of impregnated fabric and special wood structure. No heat or pressure is required in fabrication, which makes repairs in the field easy and practical. It weighs no more than equivalent metal seats. Mounting brackets, shoulder harness and adjusting fittings are the only metal portions of the seat, which are made of non-strategic materials to meet the varied design requirements. The Harvill Corporation is in Los Angeles.

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CAA Certificates for Pre-flight Students

Examinations identical with those given applicants for private pilot licenses will be given students in 14,000 high schools which have instituted pre-flight aeronautics courses, with successful applicants receiving a Civil Aeronautics Authority certificate of aeronautical knowledge. Holders of the new classification may for a period of twelve months offer the certificate as meeting the ground subjects requirements for the private pilot license, and will need to take only the medical and flight tests.

Praise for P-51, B-24

Major Tommy Hitchcock, until recently assistant military attache for air in London, has told the War Department that British and American pilots in England believe the Merlin-powered North American P-51 Mustang will be the world's best fighter plane in 1943.

At the same time, Captain Clyde Pangburn of the RAF Ferry Command visited Fort Worth in a Lancaster, England's best heavy bomber, and said the Consolidated B-24 is the fastest heavy bomber at altitude and range among Allied products.

14,611 More Planes Authorized for Navy

The second supplemental wartime appropriation and contract authorization bill signed last month by the president provided among numerous items for 14,611 new bomber and fighter planes and 500,000 tons of new aircraft carriers for the Navy.

Navy Cancels Contract

Needs for combat types were cited by the Navy in cancelling its contract with Nash-Kelvinator for 4-engined Vought-Sikorsky flying cargo boats. The planes were to be built in a new plant under construction at New Orleans.

CAA Training Women, Men for Aviation Jobs

The CAA is reopening training classes for men and women at its regional offices in Fort Worth, New York, Chicago, Atlanta, Kansas City, Seattle and Santa Monica in order to staff its control towers, communications stations and other aids to military and commercial operations. By June 30, 1943, it expects to train about 1,200 traffic controllers and 1,800 aircraft communicators.

Consolidated to Open Neighborhood Parts Plants

Harry Woodhead, president of Consolidated Aircraft, has announced a plan whereby Consolidated will open small parts plants in twelve California communities—a move calculated to ease the manpower problem by taking the work to the workers. Each small plant will train local labor for producing small parts, which will require a minimum of tooling and which will augment small parts production at San Diego.

BURBLE-LESS 'GUERRILLA' is what Edward Lanier, a Brewster Aeronautical Corporation inspector, calls this radical winged fighter of his own design. He says he has already proved in wind tunnel tests that the wing design overcomes burble troubles at ultra-high speeds.

New German Transport

A new, heavy transport seaplane rushed into the evacuation of Tunisia by the Germans was shot down by British fighters and found to be capable of carrying eighty soldiers with full equipment. It was identified as a Blohm and Voss 222.

STINSON ANNOUNCES NEW "FLYING JEEP"

Two new airplanes—a "flying jeep for the U. S. Army, designated as the L-5, and a navigation trainer for British naval pilots, designated as the AT-19—are in production by the Stinson Division of Vultee Aircraft, Incorporated, at Wayne, Michigan.

The L-5 "Sentinel" is a small, rugged, highly maneuverable plane, designed to be the "eye upstairs" of the artillery, tank corps, cavalry, and infantry. Carrying a pilot and an observer and packed with radio equipment for communication with all types of ground units as well as with other planes, it can hover and maintain altitude at an exceptionally low speed of only forty-five m.p.h., while directing artillery fire or the movement of tanks or troops below. It is extremely stable so that the pilot can concentrate on observation without fear of inadvertently stalling or spinning.

The L-5 is a veritable "flying jeep" and is designed to go wherever the ground troops go, to get in and out of farm fields or highways. It can land or take off after an unusually short run and can climb at an exceptionally sharp angle to clear trees or other obstructions.

The fuselage is made of welded steel tubing, the wings and tail surfaces of wood.

To absorb landing shocks on rough terrain, the stroke of the spring-and-oil shock absorbers was lengthened to approximately double that of conventional types. The plane is equipped with flaps and slots to increase its inherent stability and to make possible its unusual performance in take-off, landing, and steep climbing.

The Lycoming engine is a 190-horsepower horizontally opposed type. Wing span of the ship is thirty-four feet, length is twenty-four feet, weight is 2,100 pounds.

Bryan, Texas

CAP Membership Increasing

Coulter Field—Fifteen students recently completed their training with the Cardwell Flight Academy and fifty-four more have begun training. Among them are football stars, basketball stars, musicians, college graduates, mechanics, theater owners. Jiggs Walton, who hails from Marlin, was a national champion baton twirler only a few years back, and trained some of those Orange High School "greats".

Allen Academy is giving the ground school work for our boys, and they are really doing a swell job of it. All of the pilots are going to send their children to Allen Academy, and they all are hoping that the "propaganda minister", Mr. Wallis, will still be there.

The Civil Air Patrol, with Dr. Wilkerson as commander, is quite active these days, and the membership is increasing all the time. Members of the CAP who regularly fly from Coulter Field are Miss Velma Erisman, Jack Frost, Coulter Hopess, I. M. Shannon, A. E. Ferguson, Robert Felder, and J. J. Fagan, from Calvert. Dr. C. Moore, Charles Tigner, C. W. Carter, W. B. Davis, and A. S. Limouze bought an Aeronca last week, and all of them are about ready to solo.

NANN BIGGS

Enlist in your CIVIL AIR PATROL

Dallas, Texas

Love Field Closed to Private Flying

On tour with Tony—Love Field is flat, plain closed to all private flying except airline. If you want to come to Dallas, the welcome mat is out at our other fields—Hudson Field . . . Mustang Field . . . Victory Field . . . White Rock Airport . . . Curry . . . Lou Foote's . . . and Hampton. All are making arrangements to handle the extra traffic.

Love Field—"Cotton" Jeeter, of Shreveport, "jined" up with the Lockheed outfit, where business is "as usual" . . . Tom Collins is working on a red pepper deal, and is almost a steady commuter between here and Mexico. "Billy" Wofford and Jim Ryan are Air Associating . . . Dick Freeland is gonna leave us . . . gosh! . . . but Inspector Ravenstein will start to give us our check rides . . . (who, Me?)

Lou Foote's—Two guys from the Orange state—California—are Earl Waynick and Tom Swanson. They have a Stinson and are building up time to become airline pilots . . . Didja ever hear of Carrizozo, New Mexico? Well, pretty Joyce Sloan hails from there, and she is cutting some mean air to get her commercial. Elsie Gipson said that Joyce would be the youngest gal she knew who had the stuff to become a full-fledged pilot in so short a time . . . Kay Beasley, "rigger mortis" for short, is the chute instructor and packer . . . Lou Foote's is one of very few schools to have the Army, Navy and Marines all at the same time. What competition! . . . This airport extends an invitation to all private pilots, offering storage, repairs and transportation to town . . . located on South Beckley.

Hudson Field—Paved runways, gas, oil, A & E mechanic, transportation to city. Located on Northwest Highway at Garland Road. Open house to plane owners . . . Lee Davis flew E. B. Germany's plane in the November 11th parade and was on the concrete beam all the time (on the back of a float) . . . Cyde Garrett (Orange, Texas), Barney Dosterschil, Porter Harrison, J. C. Adams, Dick Mayo, and L. Kilgore watched the Ercoupe get to the ground from its float, deciding that it was the slowest ride the ship had ever made . . . John Wisenbaker (Ensign, USN) stopped by on his way to California, and flew for a few hours. He's off to the Pacific. Happy landings!

White Rock—New hangars, A & E mechanic, gas, oil, service, transportation to city. Special invitation to everybody. Located east of White Rock Lake near Buckner Boulevard . . . Ole "Hot Air" McWhitter reports: H. D. Simms at Hicks . . . F. M. Gabbert at Terrell . . . H. G. "Gas" Clark, Jr., studying to beat heck . . . Lt. Hinkley watchin' Lt. "Yard Bird" Scott watchin' Capt. C. E. Clay (CAP) come in to gas up. Some watchin'!

Mustang—Northwest Highway and Abrams Road . . . will have hi-octane gas by January 1st . . . has service, storage, gas and oil . . . Chief Mechanic, Roy Tennison . . . Harry Sellers has three gal instructors now. Jeanette Brooks and Elizabeth Peters are the latest, joining Celia Hutchinson . . . would you call that three of a kind?

Curry Field—Hooray for our side! . . . According to L. Schell, the wires will be pulled down and the runways will be graveled, and this field extends an invite to towners and outta towners to store, gas, oil, coke, and ride to town . . . Lloyd Nolan, E. R. Harvey,

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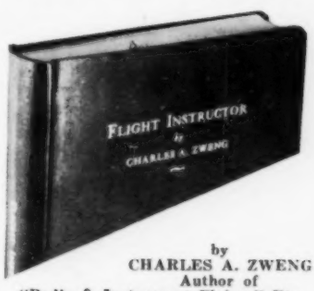

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Love Field, Dallas OF ST. LOUIS Robertson, Mo.

Malcombe Wood (usta be with Warner Bros. in Hollywood, sports a derby, wants to be a "destructor") and Neal Lyons sat in the ready room waiting for E. Gates to make a landing to see if the CAA was as good as Jack Dempsey (not the boxer) who also flies here. Anyway, they do not care to be quoted . . . This field is in South Dallas just off Beckley.

Hampton Field—Bozo is the "greeter" (fifty pounds of dog) and will be happy to show you to the new hangar, the new shops, and the rest of the field, which is improved and ready to give the best to all aviation. Located on Hampton Road in South Dallas . . . ride to city . . . you'll meet the Navy who come in for five cents' worth of soft drinks . . . and if you need a mech . . . well, chief mech is "Look Out" Tunnell, with "Cuty" Pilgrim and "Yam Eater" Slack to assist. Parts are available 'n stuff like that.

Victory Field—On South Beckley . . . bus service to city . . . and will be glad to have you stop over night. At this writing has "tie down" only, but will be improved soon . . . be seein' ya! *TONY HAGMANN*

Fort Worth, Texas

Hicks Field Men Make Headlines

Three-point landings were proudly demonstrated for Midwest's fledglings recently as V. C. Stanger and J. A. Douglas, Jr., graduated from the group by hopping their initial solo. Newest members of the field's hedge-hoppers are Pat Barnett and Miss Rowena Dehlund. Miss Catherine Vail, one of the city's newer citizens, checked in at the field to seek her commercial rating.

Doyle Alexander, another private flyer, former linotype operator with the Press, has won his rating as an Army Air Corps civilian instructor at Kelly Field. He has been assigned to Avenger Field at Sweetwater. This field, originally an RAF center, has been taken over by the Air Corps for primary training. Doyle began flying after working hours last year, and soon bought an interest in a plane with three other fledglings.

Slipstreaming — Overheard at Singleton Field: "They are just made for each other . . . he has an X-card for gas; she has four good tires." Wonder who they meant?

That new instructor at Ritchey's is Mont Roper, who won his rating a few days ago at the school, having begun flying only last summer . . . Just starting instruction with a commercial license as his goal is Mr. D. Hines . . . Miss Sidney Miller is trying to make up her mind whether to join the women's ferry service or to become an instructor. Miss Miller won her instructor's rating recently.

Out for the first time at the date of this writing, is Buddy Markum, the North Side grocer, who has been absent with his Aeronca from the runways for several weeks. "Buddie" could win his commercial rating with a few hours of regular flying . . . Back on the job at Ritchey's are Miss Evelyn Acrea, who underwent an emergency appendectomy last month, and A. D. Hatch, chief pilot, who has been ill for several days.

Hicks Field men are in the Nation's headlines again. This time it is Lt. Murray H. Weeks, pilot, who was awarded the Air Medal for an important mission over the Aleutian Islands; Lt. James Buchanan, bomber navi-

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You must have: CAA "Commercial" license with minimum 0-250 horsepower rating, validated; three letters of recommendation; written release from employer of prime contractor thereof (if previously employed by defense agency, U. S. Government, or Canadian Government).

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Houston, Texas

gator, on a successful raid on Rabaul, New Guinea; Lt. Wm. S. Beck, who distinguished himself as a pilot in a raid over the Egyptian desert, helping to panic the fleeing Germans; and Lt. Henry M. Sparger, bombardier on "The Witch", a flying fortress that successfully attacked a large enemy convoy in the Mediterranean . . . Weeks and Buchanan finished at Hicks in June, Sparger in August, and Beck in November, 1941.

MARGARET EWING BOWMAN

Enlist in your CIVIL AIR PATROL

Houston, Texas

Chinese Instructor at Aero Engine School

On tour with Tony—Having been to two county fairs, one all-day picnic, and a "rodayo", it was no surprise to find a real Chinese by the name of George L. Wing Shee teaching the Chinese students at Aero Engine School. They may become A & E mechanics without losing time learning how to chop-chop English. George Andlauer claims they are wicked wrench swingers, "larnin' " in record time.

Captain "Pete" Michael (CAP) is for sure keeping his CAP'ers on the "git to doin' it" program. He's a man who doesn't fool . . . Lt. Wallace "Two Plane" Davis gives out with the Public Relations for the Houston CAP, and reports very keen interest in all branches of the outfit.

Municipal Airport—Paul Koonce is now head man out here. He has a trainee in the CAA tower . . . a pretty doll by the name of Clyde La Belle Atha . . . All the pilots want to file their own PX's in person—a mighty peculiar thing for them to do, when a radio 'phone is so easy . . . According to Charles Ashley, clearance officer, Anita Corley is a "kinda cute gal, only scientifically minded." She "second guesses" the weather for interested parties . . . Esther "Sweet Pea" Poole will give you a pretty smile and help you with your paper work. 'Snuff dope on that.

Henry Kreigle and Earl McKaughan have the neatest set of plans for the new buildings and runways which will be down at their end of the field to accommodate the ever-increasing training program. In fact, it will be a prime honey of a larger Aviation Enterprises . . . At the other end of the field, Ellis and Smitty still "ain't a woofin' ". They are doing a fine lot of business for the Government, and have set up one of the finest production lines for an overhaul we've seen.

Scattered Clouds—Charlie Thornhill and Kenneth Craver are now hard at this business of flying. So is Shirley Helm, the legal man, who is a CAP member and a Luscombe owner . . . Cecil Beyette is wheeling and dealing the Crosby Waco . . . Charlie Sparks is CAA now . . . J. D. Rice flies S. V. Kennedy's fleet all about the countryside . . . and Charlie Scholes is in and outta town like a bee.

Jack Schweiser is up in Cowtown working for the Government . . . Paul Jackson is in Tennessee some place—same idea—Government . . . Ellis Gotcher lost his good dog "Buck" . . . and now Ellis is lost . . . Octavia Chambers likes to ditch things—like cars 'n stuff . . . Shorty Walker can take a beat-up ole prop and give it the business for a shiny new deal . . . Roy Hunt was in town . . . and Thurman Smith (San An) came in to see what the boys in the CAP room were having.

"Doc" Booth was in, conferring with R. M. Loftis . . . Red Swartz watched R. Neal fly the "what in the hen is that" ship for CAP business. After looking six times, it was a Sikorsky Model 139 working off the Gulf.

Cunninghams are back . . . Mr. Henderson is new head man at Main Street . . . and to zip Houston up, they are flying forty hours a day, at least—'cause we counted all one day . . . Bye now!

TONY

Enlist in your CIVIL AIR PATROL

Kansas City, Missouri

WNAA Unit Holds "Back the WAAC" Campaign

CAA—Major E. L. Johnson, national head of the Civilian Air Patrol organization, stopped in Kansas City briefly on his way to Emporia, Kansas, where he was scheduled to review the Kansas Wing of the CAP.

Airport Expansion—In an effort to push the transformation of all available areas into airports suitable both for military and civilian

YOU ASKED FOR IT . . .

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NAME.....
Please Print

STREET.....

CITY and STATE.....

CAP CONNECTION.....

use in every county in the state, Russell Cantwell, aviation commissioner of the Chamber of Commerce, was named chairman of a four-man committee. Suggestions of Gov. F. C. Donnell were adopted in the aviation council meeting at Mexico, Missouri.

Grandview Airport—In the first civilian plane to land on the new site, pilot Tex LaGrone settled his craft on Grandview Airport with its passengers, Mayor John B. Gage of Kansas City and W. E. Kline, new CAA Regional Director. One of Kansas City's pioneer aviators, Tex LaGrone, also had the distinction of being the first pilot to land at Richards Field.

Missouri Aviation Institute will house its Army Air Forces airplane mechanics in training at the Institute at the Boulevard Manor Hotel as of December 1st. The hotel is being converted into barracks, the building being particularly suited for its new use as it was originally built as a club house. The location offers more than 60,000 square feet of floor space.

Women in Aviation—The Kansas City Unit of the Women's National Aeronautical Association held a successful "Back the WAAC" campaign during November, at the completion of which the Unit president presented a check to one of its members now in the service of the WAAC, Third Officer Doris Jane Leeds. In accepting the fund, which will be handled by the American Red Cross, Lieut. Leeds explained that the money would be used to furnish a recreation room at Fort Des Moines. The official speaker for the "Back the WAAC" dinner, attended by over one hundred members and guests, was Third Officer Jane Mauerhan, from the Public Relations Office at Fort Des Moines. Lieut. Mauerhan discussed the "why of the Corps" and the "why of the uniform" to the assembly. This was followed by an informal question-and-answer period. The Unit further helped stimulate interest in the WAAC program by arranging radio broadcasts for Lieutenants Mauerhan and Leeds.

MARION MELCHER

Enlist in your CIVIL AIR PATROL

Shreveport, Louisiana

CAP Has New Squadron

The Shreveport Group of the Civil Air Patrol now boasts a new squadron. Captain George M. Hearne, Jr., administered the oath of office to E. A. Fuller, new commander of Squadron No. 1, and to Clifton S. Stovall, commander of the new squadron. Captain Hearne also announced members of his Group Staff as: Hal M. Arthur, executive officer; Selden Senter, adjutant; Claude Hamel, operations; R. K. Butcher, intelligence and public relations; T. E. McIvor, group equipment and supplies; Charles M. Hutchinson, group communications; James T. Mauritzen, group transportation; and Marjorie Hardman, group assistant adjutant.

Squadron Commander Fuller administered oaths to his newly-appointed staff as follows:

Standing by the WNAA booth at the Louisiana State Fair is Mrs. Mary Neal, Louisiana governor of the organization.

J. E. Menefee, executive officer; C. W. Glasscock, squadron adjutant; Kenneth C. Wilson, operations officer; Thomas E. McIvor, equipment and supplies; Henry L. Richardson, transportation, and Joseph R. Daniell, communications officer.

Squadron staff members administered oaths by Squadron Commander Stovall are: Warren C. Turner, executive officer; Thornton F. Bell, adjutant; Albert L. Bourgeois, operations officer; William L. Downer, equipment and supplies officer; Raymond L. Cook, transportation, and John B. Mays, communications officer.

The Shreveport Unit of the Women's National Aeronautical Association was represented at the Louisiana State Fair by a display including a map of all the units of the organization, by-laws, bulletins, jewelry, cups, charters, etc. Mrs. Mary Neal, Louisiana governor, and Mrs. Eugenia Boulanger, president of the local unit, directed the work in connection with the booth and are to be complimented on the results. J. W. Moore, chief instructor in the aircraft division of the Shreveport Trade School, gave an interesting talk at a recent business meeting. Mr. Moore spoke of the great demand for skilled women in the aircraft plants during the national emergency in his talk on women, their ability and aptitude in learning mechanics, welding, riveting, and blueprint reading.

Stovall Field—A new Army glider program is now well under way with the following students: Roy Sutton, Kenneth Shield, Marvin Carlson, Jerry Lindsay, Bruce Kirby, Charles Harp, Jewel Herter, Lynn Austin, Archie Johnson, Joe Mitchell, J. E. Norris, Atley Alston, A. C. Montgomery, W. W. Norris, Howard Landry, Fred Kittler, Thomas Gulledge, Bruce Williams, Lennon Thomas, and Ben Marshall.

A new hangar is now under construction at this field. There are now nineteen planes on

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In Return . . . for all the little children they have killed . . . for all the men they have strafed and murdered . . . for all the courageous defenders of our country who have met heroic death . . .

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ROVING REPORTER VISITS FIFTH FERRYING COMMAND

Capt. Robert W. Sanford, transition officer, former chief pilot for American Airlines, wears a ten-year flying star.

Ruth Hussey, Hollywood movie queen, with Major Earle E. Hamm, executive officer of the Fifth Group.

Lt. Wm. (Bill) Barbre flew for seven months with RCAF, was released to join our Air Forces, is a four-engine pilot.

Major Wm. J. Fry, graduated from Kelly in '29, flew for Chicago & Southern over eight years, formally stationed in New Orleans.

Capt. Malcomb Wallace in the Link trainer with his wife, Link Instructor. Mal was with Braniff before joining the Command.

Mrs. W. J. Brown, Red Cross, presenting the colors. She was assisted by Col. Thomas D. Ferguson, Commanding Officer of Fifth Group.

the field. The four instructors, Asa Willis, Gilbert Taylor, Sidney Little and Albert Bourgeois are kept very busy. Students now working toward a private ticket are Mike Hammett, Earnest Boden, Shannon Willoughby, Morgan Stephenson, Raymond Cook, C. A. Cardino, G. W. Trent, John Hussey, J. T. Abbitt, Robert Ross, Izzy Horwitz and L. E. Holt. Those working on commercial licenses are Gordon Wendell, Jack Rogers, Willis McNiell, Bryan Sparks, W. C. Turner and W. L. Downer. Girl students are Marie Monroe, Hazel Parker, Sue Kirkpatrick, Dorothy LaFitte, Mary Neal, Irene Minter, Josephine Doll and Mrs. Earnest Boden.

Paul Barlow, Sam Smith, Thornton Bell, H. Green and Robert Rutan are the proud possessors of new private licenses.

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Fifth Ferrying Command

Front Burner News

Squired around by Lieut. C. Fincher, of Dallas and Fort Worth, and we met Mrs. Lucile Wallace, wife of Malcombe Wallace. She is one of the two hot shot gal instructors on the Link deal for command pilots. The other is an Abilene beauty—Miss Annette Price. Both are pilots—Mrs. Wallace having about 700 hours—and they know their lingo. Lieut. J. N. Neal, formerly of Oke City, Indian Territory, made a perfect 360, and allowed that Link was a cinch under their able instruction . . . wouldn't doubt it!

For some reason—like Miss Jeanette Brooks, a darlin' of Mustang—Lieut. Charles Kincaid spends all his time at airports . . . so does Lieut. Edward Hutchinson . . . same reason, different gal . . . both pilots, tho. . . .

The new uniforms the girls are wearing are the snappiest ones we've seen. A first class double dillie of an emblem graces the right arm, and using the old dodge, they are wearing their hearts on their sleeves. Most of 'em love their work. Well, who wouldn't, with the best of the country's pilots bringing the cream of the crop right to their own back yard? P. S. Five will get you ten that Major Hamm picked out the suits and topcoats . . . they are definitely up to his standards.

Four Star news: Capt. Robt. W. "Sandy" Sanford, formerly of American Airlines, and Wyatt H. "Alex" Alexander, formerly of Eastern Airlines, were the crack pilots of their companies, and are now "Heads Up" of the Transition Office. Each one thinks the other is the better pilot and they compliment each other all the time. If they'd flip a coin and it stood on edge the dispute would be easily settled . . . probably that's the only way.

The boys have "Hutments in a compound" when they are waiting for their planes to be ready to go. "Hutments" are little square, prefabricated houses wrapped around some very neat numbers of the Red Cross. The "compound" is an African idea. The Hutments are placed so as to give the greatest protection . . . from the wind, no doubt. And one can find "Busy Needles" (gals who sew), "Brain Trust" (gals in the library) or "Coffee-Donut Gals" (obviously in the Canteen), in these little jobs taking care of all these little duties with the best intentions . . . *and* results . . . you see, most of 'em are highly pretty.

In the PX were Bob Brennand, Midland, Texas, product; Corp. J. Lovell and some lads from Col. Spake's Long Beach Command; Lt. Joe De Bona; Lt. Clarence A. Conray; and Pilot Otto "Buddy" Vehle enjoying the "ten, two and four" juice in a five-cent bottle.

OLE TONY

Great Expansion Cited By First Annual Review Of Civil Air Patrol

On December 1, 1941, a week before Pearl Harbor, CAP was created by the Office of Civilian Defense, after months of planning by a committee of airmen. Thousands of pilots previously flying as individuals were banded into units disciplined to prevent flights by unauthorized persons or violations of wartime regulations. Otherwise it would have been necessary to ground private flying.

63,000 Members

More than 63,000 civilian volunteers have been enrolled. A Wing of CAP in each of the forty-eight states reports directly to CAP National Headquarters which is staffed by several officers of the Army Air Forces. Under the Wing Commands, local Squadrons and Flights are active at more than 1,000 airports. The larger State Wings are divided into Group Commands with several Squadrons in each Group.

Each Wing, Group, and Squadron has its own commander and staff officers assigned to special duties such as operations, intelligence, communications, transportation, and medical. About a third of the members are pilots; a third are student pilots; and the rest have special skills as mechanics, radio operators, photographers, nurses, typists, and ground crew. Each unit is self-contained with the personnel, equipment, and training to perform any mission that light planes can fly.

Intensive Training

CAP is not a flight training corps but rather an organization of citizens with prior experience applicable to aviation. Its training program, however, not only has advanced the skill of airmen in CAP, but has encouraged many with little or no previous experience to take lessons and become good pilots.

Each member is required to cover the ground study necessary for a private pilot's license. The basic CAP course of eighty-one hours stresses military and defense subjects such as Infantry drill, discipline, first aid, gas protection, military secrecy, and signaling. The advanced course of 150 hours includes air navigation, meteorology, crash procedure, and a number of flying missions simulating the actual wartime assignments of the Patrol.

Coastal Patrol Expanded

Thousands who have been able to volunteer thirty days or more of continuous service have been detached from their Squadrons for assignment to active-duty missions which CAP performs for the Army.

Early in the year, when the Axis submarines began to take a heavy toll of shipping on the vital supply routes along our coast, CAP organized a series of Coastal Patrols at points designated by the Army. According to Maj. Gen. Follett Bradley, these "Flying Minute Men" brought their own planes, repair tools, radios, and other equipment to fly on watch over the coastal waters.

Subs spotted by CAP observers have been sunk, General Bradley has revealed. Others about to attack merchant vessels have crash dived at the approach of CAP planes. Vessels in distress have been reported and hundreds of survivors of torpedoing have been rescued when their position was radioed to shore. The Coastal Patrol bases, under the command of CAP National Headquarters, have their own CAP officers. Many members have volunteered for the duration in this work.

Many Inland Activities

Courier service totaling thousands of miles a day on regular routes and schedules is being flown to carry officers, dispatches, and rush shipments between Army posts. Other work includes towing aerial gunnery targets, tracking flights for guns and searchlights, aerial reconnaissance and inspection, simulated air support for ground troops in training, and searches for lost aircraft.

For the U. S. Forest Service, area patrol and observation flights over fires have been conducted to conserve timber resources in a number of states. Federal officials have been carried on rush trips. For war production plants, courier services have been organized in many areas to carry key executives and urgent shipments such as machine parts. In some cases, the stoppage of assembly lines has been prevented by this aerial pony express.

Volunteer Missions

Mock air raids to put the Civilian Defense workers on the alert, blackout observations, and tests of the air-raid warning network are among the jobs done in co-operation with Civilian Defense authorities. Intensive aerial searches have been made for salvage metal piles. In recruiting and war bond drives, CAP planes drop handbills and stage maneuvers to draw crowds.

In local disasters such as floods and tornados, the Squadrons turn out for reconnaissance and rescue, guard duty, and the flying of medical supplies, demonstrating the alertness with which they would meet a war emergency.

As a young people's auxiliary, the CAP Cadets are organizing a limited number of boys and girls in the last two years of senior high school. Each CAP Squadron may form a CAPC Squadron and each CAP member may sponsor a Cadet recruit.

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PROCEDURE FOR ENLISTMENT

1. Application for enlistment shall be made upon those forms which have been printed and distributed among the civil airmen of the United States for that purpose by the Office of Civilian Defense.

2. No application for enlistment will be considered which is lacking in any of the fundamental information nor on which the Oath of Allegiance to the United States remains unsigned.

3. No application for enlistment shall be considered unless such application is accompanied by the completed fingerprint card furnished by the Federal Bureau of Investigation for this purpose and filed by the applicant together with three full-face photographs of the applicant.

4. Upon check of eligibility by the FBI, information shall be transferred from the application to a duplicate service record made out according to the name and serial number of the applicant, one copy of which shall be retained in the files at National Headquarters of the Civil Air Patrol, and the other copy of which shall be forwarded to the Wing Commander for assignment to proper Group and Squadron.

5. Upon receipt of the application of enlistment, form notice shall be immediately mailed to the applicant of the receipt of the application at National Headquarters.

6. Accompanying the service record of the applicant which is returned to Squadron through channels there shall be an identification card with photograph of the applicant attached and stamped by the seal of the Civil Air Patrol of the Office of Civilian Defense which identification card shall be ultimately delivered to the applicant by the Squadron Commander unless at any point of command, in the Wing, the Group or the Squadron, reasonable grounds for withholding the identification card from the applicant shall have been filed at the National Headquarters of the Civil Air Patrol, in which case the application shall be reviewed by Board appointed for such purpose by the National Commander.

7. Upon assignment of the applicant, the Squadron Commander shall be responsible for transmitting through channels the date of assignment, classification, Group and Squadron of each person enlisted in his Squadron. Following the organization of the Squadron, a monthly report of transfers, promotions, changes in flight ratings, training courses completed, commendations, or disciplinary actions shall be forwarded on the first of each month through channels to National Headquarters of the Civil Air Patrol.

8. Recruitment of members must be held insofar as possible to pilots, student pilots, radio operators, radio mechanics, aircraft mechanics, apprentice mechanics, parachute riggers, ground service men, and others of actual aviation skill.

9. Applications from **non-flyers other than the above-listed categories will not** be approved by National Headquarters unless **endorsed** on the back by **Wing, Group, or Squadron Commander.** Such application without endorsement will be returned to the applicant with the advice that he should apply through his nearest CAP unit.

10. It is preferable that applicants for approved-type personnel likewise be endorsed by Wing, Group, or Squadron Commander. Applications for people **not**

FOLD ALONG THIS LINE

Foreword

The rapid and successful organization of the nation's wealthy civilian aviation resources into a hard-hitting, vigorous force known as the Civil Air Patrol, brought into being immediately after Pearl Harbor on December 7, 1941, marks one of the truly great historical milestones in America's brilliant aeronautical history.

At the time we were precipitated into this, the bloodiest of all wars, our nation was struggling desperately in an eleventh-hour rush to lift itself up from a fifth-rate airpower nation to a first-rate power. Fortunately, civil aviation had prospered in the preceding years, providing a backlog of hundreds of thousands of skilled airmen whose ranks included pilots, student pilots, instructors, aviation mechanics, aviation instrument, radio and accessory repairmen, meteorologists, navigators and others together with an active flying reservoir of some 27,000 civilian aircraft of every make, age, horsepower, and design, and hundreds of commercial, private and municipal airports equipped with hangar and service facilities.

America's private airmen accepted the challenge. Hundreds upon hundreds of trained Civil Air Patrol members went without delay into active duty for the military services and other branches of Federal and State governments.

As a service to those who made the Civil Air Patrol the vital force it became in Civilian Defense, SOUTHERN FLIGHT is publishing the Civil Air Patrol Handbook. Its purpose is to serve as a convenient, easily-kept storehouse of valuable information and a reliable reference book for CAP members who are in search of thorough understanding of CAP organization, official procedure and the vital training program as set down in brilliantly prepared training directives.

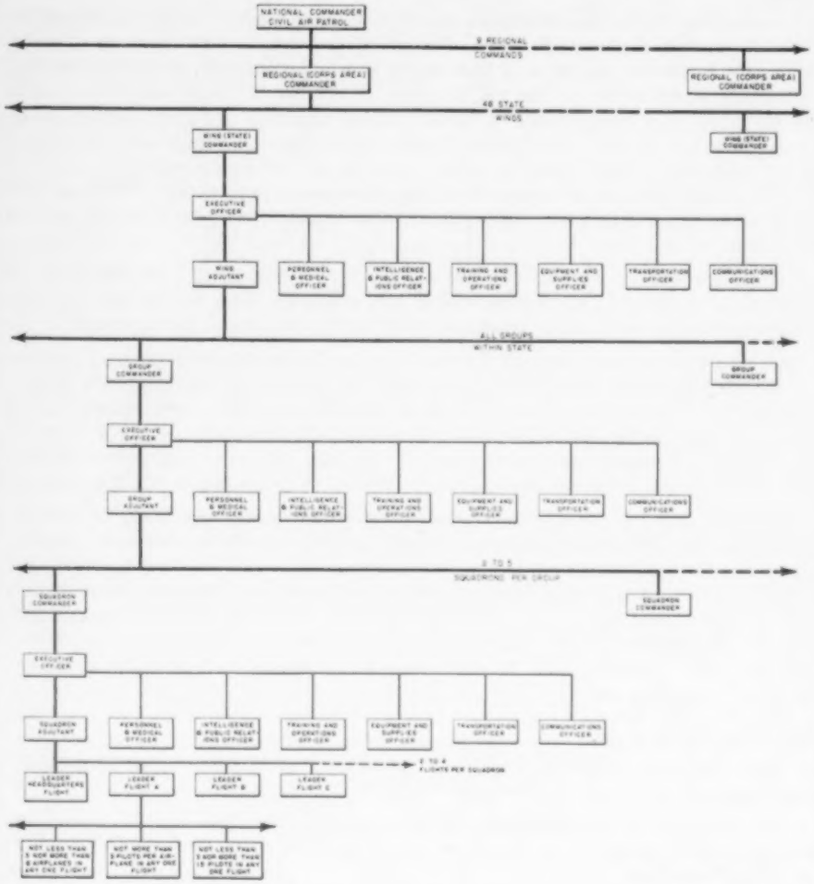
The Civil Air Patrol Handbook will condense and codify the many operations directives, general orders, memoranda and training directives released progressively by National Headquarters in Washington. It was conceived by Civil Air Patrol members who, with Major Earle L. Johnson, the National Commander, and his associates, saw in it a vital utility. The Civil Air Patrol Handbook will provide widespread and thorough distribution of official material which heretofore has been restricted to Unit Commanders. National CAP Headquarters, because of necessary economy and physical limitations, has been unable to supply each and every member copies of important releases. Moreover, the Civil Air Patrol Handbook's utility goes farther and enables new and prospective members to study material released before their enlistment, allowing them to bring their knowledge of procedure up to date.

The publishers of SOUTHERN FLIGHT are grateful to National Headquarters for permission to make this Handbook available, as a non-profit service, to Civil Air Patrol members everywhere. They express also their deep appreciation of the splendid co-operation by the Headquarters Staff in Washington, which makes codification possible.

Dallas, Texas
September 15, 1942

TACTICAL & ADMINISTRATIVE ORGANIZATION CHART
SHOWING WING CROSS-SECTION

CIVIL AIR PATROL



ORIGIN

The origin of the Civil Air Patrol is credited to the universal demand of the civil airmen of the United States to be utilized, together with their equipment and facilities, in the common defense.

PURPOSE

The purpose of the Civil Air Patrol is to mobilize and organize the civil aviation personnel and equipment of the nation not otherwise actively engaged full-time in governmental service or commercial air transportation activities, that such may be available and effective for auxiliary service to the armed and civil defense forces of the United States, and further that civil aviation may be preserved and activated for the post-war requirements of the United States.

The Civil Air Patrol is further declared to be founded upon the basis of voluntary service to the national defense by the flying and ground personnel of civil aviation, augmented by personnel of special skills which are related to the operation and maintenance of civil aviation equipment and facilities.

ORGANIZATION

National Headquarters of the Civil Air Patrol are located in the quarters of the Office of Civilian Defense, DuPont Circle Apartment Building, Washington, D. C., with regional offices established in the quarters of the Regional Directors of OCD, the geographical limits of which are co-terminal with the War Department Corps Areas.

The National Commander of Civil Air Patrol with office in Washington, and the Regional Commanders, who are in charge of the territory embraced in the Nine Corps Areas, are U. S. Army Air Forces commissioned officers. Under the Regional Commanders are the Wing Commanders. Each Wing is set up to embrace the geographical boundaries of a state. They have been appointed for their ability to organize and co-ordinate the available civil air resources within the boundaries of the states. Many of them are veteran pilots. Others have but limited flying experience as pilots. All of them are leaders. Their duty is to secure budgets, keeping liaison with local war and defense agencies, forming their personnel into Groups, with the heavy responsibility of creating and keeping alive a strong, active, well-trained state organization.

Under the Wing Commanders come the Group Commanders. They select Squadron Commanders, assist in the organization of Squadrons within their territorial limits and co-ordinate Squadron activities. Beginning with the Group Commanders pilot and specialized aviation experience count heavily. In these brackets of command will be the tacticians. Theirs is the job of missions, training and the all-important discipline.

Operating directly under the Group Commanders are the Squadron Commanders. In the local Squadron the service record of the volunteer is kept. Within the squadron Flights are organized, under Flight Leaders chosen by the Squadron commanding officer. The nerve-center of CAP, therefore, actually rests in the local flights and squadrons. From them come the properly trained personnel adequately prepared for active duty assignment.

organize. However, in the beginning the judgment of each Wing Commander must determine the number of Groups he wishes to currently activate.

(f) The Wing Commander shall help each such Group Commander to establish Group Headquarters and a Group Staff.

(g) Training Directives are forwarded directly from National Headquarters to the Wing Commanders who are responsible for transmitting them to the Group Commanders who shall in turn transmit them to the Squadron Commanders.

(h) The Wing Commanders have authority to grant permission to persons properly enrolled in the Civil Air Patrol to paint or otherwise place the insignia of the Civil Air Patrol upon their aircraft or automobiles.

UNIFORM

1. By authority of the War Department, Civil Air Patrol may wear the regular Army uniform with certain distinguishing features which apply to **all** personnel, officers or enlisted men, as follows:

(a) Red shoulder loops—Will be worn on shirt, jacket, blouse or outer garment. Color of loop will be Cable No. 14906—Textile Color Card Association. No deviation or near substitute will be permitted. The red loop will be of size and shape of the regular loop on an officer garment.

(b) Sleeve emblem—The official CAP shoulder patch, bearing three-bladed propeller emblem of Civil Air Patrol and the letters U. S., will be worn on the left sleeve of all outer garments, one-half inch below shoulder seam.

(c) Cap—Army Officers' Overseas cap; remove piping and substitue **red piping**, same color as shoulder loop.

2. **Minimum uniform** to be purchased and kept in good condition by each member shall consist of: **shirt**, Army Officers' type, khaki or chino, with red shoulder loops; **trousers**, khaki or chino, without cuffs except for **women members** for whom **culottes** are the official wear; **belt**, tan web, plain brass buckle; **shoes**, tan Oxfords, plain toes, strap and buckle preferred to laces; **socks**, plain tan; **tie**, plain tan, no tie pin; **cap**, overseas.

3. **The shirt** is the prescribed wear except in weather which requires outer garments such as the regulation Officers' field jacket, leather flying jacket, or trench coat. It is recommended that CAP units wear outer garments alike, insofar as possible without undue expense.

4. **Blouse**, Air Corps Officers', with the sleeve braid removed and **red braid**, same color as the shoulder loops, substituted, and with **silver CAP buttons** in place of the gold buttons. Purchase of blouse is optional. Its wear is recommended for Wing, Group, and Squadron Commanders. Members will find it more practical to wear the field jacket or leather flying jacket.

5. **Wearing of the Uniform** is required during all flying missions and drills of Civil Air Patrol and at such other times as unit commanders may prescribe. Members on active duty will wear the correct uniform throughout the period of their assignment under the same rules that apply to Army personnel in this regard. Unauthorized items will not be worn.

needed locally should **not** be sent to Washington as it is a waste of Government time and facilities to process their papers.

11. Applications bearing endorsement will be returned to the endorsers via CAP channels on Washington clearance.

WING, GROUP AND SQUADRON ADMINISTRATIVE PROCEDURE

1. General

(a) When service records accompanied by identification cards reach Wing Commanders, they are to take the following steps and instruct Group and Squadron Commanders as to the proper procedure to be followed in handling the service records and accompanying identification cards.

(b) Carefully review service records and abstract any information essential to files of organization office.

(c) Withhold and return to the National Headquarters the service record and identification card of any applicant of whom the Wing Commander may disapprove because of disloyalty to the United States or other reasons. Such service record and identification card shall in each case be accompanied by a complete statement of reasons for their return.

(d) If the applicant is approved, transmit service record and identification card to proper Group Commander.

(e) Group Commanders will review the service record, assign the applicant to the proper Squadron and forward the service record and identification card to the Squadron Commander.

2. Squadron Responsibility

(a) When service record and identification card reach the Squadron Commanders from the Group Commanders, the procedure will be:

(b) The file of the Squadron is the final repository of the service record.

(c) The Squadron Commander upon receipt of service record and identification card will notify applicant to report for personal interview.

(d) If satisfied with applicant following interview, Squadron Commander will issue applicant identification card and assign to duty in proper classification after applicant has taken oath of allegiance by verbal repetition to Squadron Commander. If not satisfied, the Squadron Commander will return service record and identification card to the Group Commander with full statement of reason for his action. The Group Commander will either assign the applicant to another Squadron or else return service record and identification card through the Wing Commander to National Headquarters with his recommendations.

(e) If a member desires reassignment to another Squadron in the Wing to which he was originally assigned, Squadron Commander will forward the request via Group Headquarters to Wing Headquarters together with recommendations as to action to be taken. Wing Headquarters will either reassign or turn down request. In case of reassignment within a Wing, the service record will be

forwarded via Group Headquarters to Wing Headquarters for reforwarding through Group Headquarters to the new Squadron Commander. National Headquarters shall be notified of such reassignment. In case of reassignment to another Wing, the service record and identification card will be forwarded to National Headquarters through Group and Wing Headquarters. The name of the state to which transfer is requested will be given and also the new address. Personnel can do much to avoid unnecessary transfers by having new applicants specify the Wing to which they wish to be assigned.

(f) Squadron Commander should forward to National Headquarters **through Group and Wing Headquarters,** notification of final assignment and classification of applicant stating Group and Squadron. Classification shall be one of the following: Pilot, Observer, Mechanic, Radio Operator, Photographer, Control Tower Operator, Doctor, Nurse, Motor Vehicle Operator, Clerical Worker, or Airport Helper. While classifications will be made by Squadron Commanders, it will be noted that flying personnel will be rated by National Headquarters after qualification has been determined.

(g) In the event of resignation, dismissal or death of a member, the Squadron Commander shall return service record and identification card through Group and Wing Headquarters to National Headquarters together with a complete statement of the circumstances. If the identification card cannot be obtained, a written explanation shall be made.

ASSIGNMENT TO DUTY

Before assignment to duty:

1. Each pilot must produce a currently acceptable pilot certificate issued by the Civil Aeronautics Administration for the inspection of the Flight Leader.

2. Flight Leaders shall not place any person on flying duty until the Flight Leader has personally seen and inspected the CAA certificate of said person.

3. No pilot shall be placed on flying status until the Flight Leader has checked out such pilot or knows definitely and personally that such pilot is competent to fly the aircraft to which he is assigned, under conditions meeting all requirements of the regulations of the Civil Aeronautics Administration.

4. Non-flying personnel shall be placed on a duty status only after the Flight Leader has assured himself of the loyalty and integrity of the person concerned.

INSTRUCTION ON WING ORGANIZATION

The Wing Commander shall be responsible for organization of Civil Air Patrol personnel in his State according to the plan set forth in the Tactical and Administrative chart of the Civil Air Patrol.

Successive steps of organization are as follows:

(a) Selection of location of Wing Headquarters.

(b) Secure clerical assistance by seeking co-operation of State Governor and State Defense Council authorities.

(c) Selection of Executive Officer. The Executive Officer should have available time, be familiar with the affairs of the State, a capable organizer and able to work under pressure. He need not be a pilot.

FOLD ALONG THIS LINE

(d) Selection of Wing Staff. Each man on the Wing Staff is of vital importance. All Unit Staff officers are of equal rank.

DUTIES AND QUALIFICATIONS OF STAFF OFFICERS

The Adjutant—Keeps the records; transmits orders of the Commander and Executive Officer; must be a pilot or observer.

Personnel and Medical Officer—Responsible for mental and physical fitness of personnel. Reports on discipline and attitude of personnel. Makes recommendations to Commanding Officer if personnel are unfit for flight duty. Need not be a pilot. Will handle personnel records under direction of the adjutant at the discretion of the Commanding Officer.

Intelligence and Public Relations Officer—Handles publicity; secures public understanding of the work and purpose of Civil Air Patrol; provides confidential information for Unit Commander; need not be a pilot.

Training and Operations Officer—Must be an experienced pilot. Responsible for training within the unit. Plans and supervises missions. Responsible for carrying out the orders of the Commanding Officer in relation to all operations.

Equipment and Supplies Officer—Responsible for all unit property and records of same. Need not be a pilot.

Transportation Officer—Has charge of all ground transportation matters. Need not be a pilot.

Communications Officer—Must be an experienced radio operator. Has charge of all communications, radio, telegraph and telephone. Is responsible for weather reports, message centers, etc.

Where desirable Wing Commander may assign a Staff Officer to more than one section and he may also appoint assistant section officers if desirable. The judgment of the Wing Commander will be relied upon to make any adjustments which to his mind increases the efficiency of his command. He may remove or appoint staff officers at any time or transfer staff personnel from one section to another.

The Wing Commander is responsible for the training of his staff, the understanding by each of his exact duties, privileges and responsibilities. He will hold frequent staff meetings, keep his staff constantly informed of his policies and decisions and have them advise and counsel with him upon all vital matters. He will depend upon his staff to carry out the work of the Wing, rather than attempt to do all the work himself. He should not fear to delegate authority and should back up the judgment and decisions of his staff members, unless he is convinced they are unsound.

(e) The Wing Commanding Officer with the advice of his staff shall analyze his potential Wing strength, and the logical locations for Group organizations. This problem will differ in each State. Density of aeronautic population and geographical considerations will influence his judgment. As a basic rule the Wing Commander will take the number of certificated pilots in this State and double this number to allow for student pilots now coming along, and for ground personnel. If the Wing Commander keeps his figure in mind (double the number of his State pilots) he will have a basis for the number of Groups he must eventually

4. Commissioned Officers	Rank or Grade
Wing Commander	Major
Wing Staff Officer	Captain
Group Commander	Captain
Group Staff Officer	First Lieutenant
Squadron Commander	First Lieutenant
Squadron Staff Officer	Second Lieutenant
Flight Leader	Second Lieutenant
Deputy Staff Officer	Flight Officer
Pilot Officer	Flight Officer
Observer Officer	Flight Officer
5. Non-Commissioned Officers	
Pilot	Technical Sergeant
Observer	Sergeant
Photographer	Sergeant
Clerk	Corporal
Stenographer	Private, First Class
Mechanic, A and E	Master Sergeant
Mechanic A or E	Technical Sergeant
Radio Operator	Technical Sergeant
6. All Other Personnel	Private

7. **Commissioned Officers.** Appointments of Civil Air Patrol Officers as Major, Captain, First Lieutenant, and Second Lieutenant will be made by the National Commander upon recommendation of the Wing Commander. Flight Officer appointments will be made by the Wing Commander.

8. **Non-Commissioned Officers.** Appointments of all grades of non-commissioned officers authorized will be made by the appropriate Unit Commander.

9. The official recommendation for commission in Civil Air Patrol in the grade of Captain, First and Second Lieutenant will be made to the National Commander on special report SR-11 in all instances.

10. Commissions and appointments in grade will be in the Civil Air Patrol and not in the Army of the United States.

TRAINING PROGRAM

1. **Objective.** The objective of the training program is to give the members and organized units of the Civil Air Patrol the individual and group training necessary to prepare them for the duties and missions they may be called upon to perform and thus make the Patrol of maximum value to the armed and civilian components of defense. The work of teaching student pilots to fly and of making airplane and engine mechanics out of student mechanics is outside the province of this organization. Civil Air Patrol's job is to enroll personnel with basic aviation skills and abilities, classify and organize them, and give them such basic defense training as may be necessary to make the individual members and the units of the Civil Air Patrol of maximum value for auxiliary service to the armed and civilian defense forces of the United States.

2. **Advisory Committee on Training Directive.** To advise and assist the Civil Air Patrol in the planning and conduct of its training program, there has been

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INSIGNIA

1. The following insignia have been approved for Civil Air Patrol by the War Department. Correct insignia will be worn on the authorized uniform at all times as specified below. **Never mix the insignia.** Do not wear any part of State Guard, Reserve, or other insignia on the CAP uniform. Discharged Army personnel will not wear qualification medals or Army wings. However, service ribbons and decorations may be worn.

2. **Officers insignia shall be:**

(a) Silver CAP instead of gold U. S. on right shirt collar and on lapels of blouse.

(b) Silver Wings same design as Air Corps Officers' collar ornament on left shirt collar, on lapels of blouse below the CAP, and on left side of cap, one inch from front.

(c) Insignia of rank, regulation Army; will not be worn without the red shoulder loops and without written appointment in grade by National Headquarters.

3. **Flight Officers and Warrant Officers**—Same uniform and insignia as officers without insignia of rank. Flight Officers include all members with accredited aeronautical ratings as Pilot Officers or Observer Officers and not appointed as commissioned Officers.

4. **Enlisted personnel:**

a. Disk insignia, CAP three-bladed propeller emblem, silver and enamel in colors, on cap and on blouse lapels if blouse is worn.

(b) Chevrons, regulation Army, on **red patch** same color as shoulder loop, on both sleeves half way between elbow and shoulder seam for non-commissioned officers and first-class privates.

(c) Shirt—No collar insignia.

5. **Title Insignia**—Sleeve insignia denoting Wing, Group, and Squadron Commanders and Staff and Flight Leaders, optional, to be worn one-half inch below the CAP sleeve insignia on the left sleeve.

6. **Aeronautical Ratings**—For pilots and observers qualified in accordance with Operations Directive No. 10. Worn above left shirt or blouse pocket or on left breast of flying jacket. Silver.

(a) Pilot wings:
1. Pilot or Pilot Officer
2. Senior Pilot Officer
3. Master Pilot Officer

(b) Observer wing:
1. Observer or Observer Officer
2. Senior Observer Officer

7. **Mechanic and Radio Ratings**—Worn on forearm of right sleeve, half way between elbow and bottom of cuff.

(a) Mechanic—Holder of currently valid CAA A & E Mechanic license. Radiotelephone or Radio Telegraph Operator or Amateur Class A.

8. **Volunteers**—Members who volunteer for specified periods of active-duty

service, pursuant to GM-32, on signing active-duty oath, may wear a special V-shaped emblem on the forearm of the left sleeve, half way between the elbow and the bottom of the cuff, in colors as follows:

(a) Red—One or two months continuous service per year.

(b) White—Three months per year.

(c) Blue—Duration of war.

9. Service Stripe—An active duty volunteer may wear a service stripe for each term of active duty completed; not more than one stripe per year. The service stripes shall be centered three-fourth inch below the V emblem and one-half inch apart. Colors: red for one month service completed; white for two months; blue for three months or more service in a year.

10. Merit Awards—Emblems, authorized for individuals only on special order of the National Commander, will be triangular and will be worn point down above the left pocket of the shirt or blouse as follows:

(a) Red: **Commendation**—For exceptional performance contributory to the planning or execution of missions of unusual merit.

(b) White: **Merit Citation**—For initiative and performance of unusual merit on specific missions.

(c) Blue: **Distinguished Service Citations**—For exceptional performance of specific missions, or acts of heroism, under unusually difficult or hazardous conditions.

11. Civilian Wear—A small lapel emblem bearing the CAP three-bladed propeller emblem without the U. S. similar to the CAP pilot wings may be worn by accredited members not in uniform. No other insignia of the Patrol will be worn except on full and correct CAP uniforms. CAP insignia will not be worn by members wearing shoulder patch with U. S. The CAP insignia will not be worn or displayed on aircraft or vehicles except by accredited members of CAP.

12. Display of CAP Insignia on Aircraft and Vehicles—The Civil Air Patrol insignia will be painted or placed by decals on the wings and fuselage of all aircraft engaged in official CAP missions as follows:

(a) Wings—Insignia disks shall be centered on the top of the left wing and on the bottom of the right wing at a point one-third of the distance from the wing tip to the fuselage. Diameter of disk shall not exceed two-thirds of the wing chord at point of application.

(b) Fuselage—Insignia disks shall be centered on both side of the fuselage at a point one-third of the distance from the leading edge of the horizontal stabilizer to the trailing edge of the wing. Diameter of disk shall not exceed two-thirds of the depth of fuselage at point of application.

(c) Use of Planes—Any aircraft while displaying such insignia shall be flown exclusively by members of the Civil Air Patrol. This is not to be construed as requiring the display of CAP insignia on aircraft engaged in CAP practice activities, or limiting participation of aircraft bearing insignia in such activities, or preventing aircraft with insignia from being used in non-official flying provided the pilot is a member of CAP.

(d) Autos—Insignia may be displayed on autos, trailers, and other vehicles owned and operated by CAP members and used in CAP missions. Stickers and plates embodying insignia shall be circular, from four to twelve inches in diameter, or rectangular, no larger than six by twelve inches. Automobile stickers and plates may be used only in compliance with state laws applicable to windshield or vehicle stickers.

(e) Omit U. S.—The U. S. is to appear on the sleeve emblem, arm band, and official CAP flags, and is to be omitted from insignia for aircraft, autos, or all other uses.

13. Ordering Insignia—In purchasing uniform and insignia items not obtainable in retail stores, members will place orders through their unit Supply Officers. Orders will be transmitted to the supply source by the Wing Commander who may delegate this responsibility to Wing, Group, or Squadron Supply Officers signing for him. Orders for Task Force members may be placed by the Task Force Commander or his duly authorized deputy signing by his order.

14. Manufacturing of CAP Insignia—Pursuant to Section 3 of Office of Civilian Defense Regulations No. 2, no official articles, including collar and cap emblems, sleeve insignia, uniform buttons, aircraft decal insignia, lapel pins and buttons, arm bands, and automobile stickers and plates, may be manufactured, sold, or distributed by any manufacturer without a license readily obtainable from the Insignia Section in Washington office of OCD. This applies to all articles embodying the CAP insignia (blue disk with superimposed white triangle and with red three-bladed propeller superimposed on triangle) or any reproduction of this design in any color.

RANK

1. All Group Commanders, Squadron Commanders and Flight Leaders and all staff officers to be eligible for appointment with rank, shall have completed the prescribed Training Directives as follows and shall be prepared to pass a written examination thereon:

No. 1	3 hrs.	No. 14	1 hr.
No. 2	20 hrs.	No. 15	1 hr.
No. 3	2 hrs.	No. 16	5 hrs.
No. 5	4 hrs.	No. 19	3 hrs.
No. 6	6 hrs.	No. 20	2 hrs.
No. 9	3 hrs.	No. 21	5 hrs.
No. 10	2 hrs.	No. 22	8 hrs.
No. 11	2 hrs.	No. 24	10 hrs.
No. 12	2 hrs.	No. 29	2 hrs.
	44 hrs.		37 hrs.

2. Prior to making recommendations to the National Commander, all Wing Commanders will ascertain first that each recommended member has completed the prescribed Training Directives listed herein and that the member's service record has been officially certified to that effect.

3. Each such member qualifying for position as a commissioned officer may be appointed to a position by the Wing Commander with temporary rank in grade pending approval by the National Commander, providing he has served in the same position, or a position of equal grade, for not less than sixty days. If member has not served sixty days, he will be appointed one grade in rank lower than that which the position calls for, until such time as he has served for sixty days, at which time the Wing Commander may recommend the member for promotion.

3. Distribution of Texts

Copies of these texts will be distributed to units of the Civil Air Patrol on the basis of two copies of each manual per unit.

4. Requirement

Unit commanders are urged to see that all members of their commands acquire (1) a practical working knowledge of the Infantry Drill Regulations as applied to Foot Troops Without Arms and (2) a reasonable degree of proficiency in such drill.

5. Instruction Procedure

It is recommended that each unit commander enlist the services of volunteer instructors capable of giving proper instruction in Infantry Drill. It is further recommended that training in this subject be carried on concurrently with other Civil Air Patrol instruction to the end that training periods may be divided between classroom instruction and drill. For example, a two-hour weekly training period might well be divided in such a manner as to devote forty-five minutes to drill and the remaining time to subjects covered by other training directives.

TRAINING DIRECTIVE No. 3
LOCAL CIVILIAN DEFENSE FAMILIARIZATION

1. General

Total war, commonly said to be a new kind of war, is as old as mankind and used to be called "the law of tooth and talon." Total war opposes not only the armed forces of its enemies, but the civilian populations as well. It strikes at men and women, children and old people, seeking to create terror and havoc, panic and suffering among the noncombatant population in order to force surrender upon their government. That is why it is necessary to set up organizations and means to provide suitable air-raid warning systems and shelters; to minimize the effects of air-raid damage; to keep people calm; to aid civilian casualties and clear them to hospitals; to protect them against fear and disease and fire and panic, as much as against explosions of bombs, or against gases; and to care for and strengthen the health and morale of the people themselves. The Civil Air Patrol will be called upon to perform many missions to assist in carrying out these objectives, hence it is necessary that all members of the Patrol be thoroughly familiar with the organization and functions of their local civilian defense agencies.

2. Instruction Procedure

It is recommended that unit commanders arrange with their local Civilian Defense Councils to provide capable volunteer instructors to conduct courses of instruction that will thoroughly familiarize the members of the Patrol with the organization of all local civilian defense, police, fire department, and first-aid agencies, the services they perform, where they are located and how they may be reached in case of emergency. This course of instruction may be carried on concurrently with other Civil Air Patrol instruction.

3. Service Records and Reports

As in the case of all other Civil Air Patrol instruction courses, satisfactory completion of this course of instruction by members of the Patrol shall be entered on their respective Service Record Cards and reported to National Headquarters on the monthly Service Reports forwarded through channels.

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created an Advisory Committee on Training Directives. This committee is made up of experienced representatives of the Army, Navy, Coast Guard, Civil Aeronautics Administration, U. S. Office of Education, Training and Re-employment Division of Works Progress Administration, National Youth Administration, Office of Civilian Defense, and civil aviation activities, and is organized into subcommittees.

3. Scope of Training. The training program consists of a series of basic and specialized courses. The basic courses are required of all members of the Patrol and include such subjects as military courtesy and discipline, infantry drill for foot troops without arms, local civilian defense familiarization, first aid for civilian defense, national defense familiarization, and airport protection. Specialized courses for both the flying and the ground personnel include such subjects as terrain familiarization, map and aerial photograph reading, meteorology, aerial navigation, aviation communications, observation and reconnaissance aviation, aircraft maintenance, airport service operations, and motor transportation.

4. Training Directives. Training Directives are issued by National Headquarters covering the courses of instruction. Each of these directives states the purpose of the course covered, list the text or texts to be used, or other source or sources from which material is drawn, and recommends the instruction procedure to be followed in conducting the course. Copies of the Training Directives are available from National Headquarters to the Wing Commanders in sufficient quantity for distribution to Group and Squadron units.

SCHEDULE OF BASIC TRAINING COURSES

1. Following is a schedule listing the subjects covered by the Training Directives comprising the basic course of instruction required of all members of the Civil Air Patrol and the minimum number of hours of instruction to be devoted to each subject:

Training Directive No.	Subject	Hours of Instruction Required
1	Military Courtesy and Discipline	3
2	Infantry Drill Regulations for Foot Troops without Arms	20
3	Local Civilian Defense Familiarization	2
4	First Aid Course for Civilian Defense	20
5	Interior Guard Duty	4
6	Defense Against Gas	6
7	Protective Concealment	2
8	Crash Procedure	6
9	Organization of the Army	3
10	Organization of the Navy	2
11	Organization of the Army Air Forces	2
12	Reviews and Inspections	2
	Total Instruction Hours Required	72

2. Qualified volunteers will be enlisted to serve as instructors. Training will be conducted through such media as classroom instruction, lectures, discussion forums, drills, and special training missions.

SCHEDULE OF SPECIALIZED TRAINING COURSES

1. The following schedule lists the subjects covered by the Training Directives for the Specialized Training Courses of the Civil Air Patrol and gives the minimum number of hours of instruction to be devoted to each subject:

Training Directive No.	Subject	Hours of Instruction Required
13	Air Navigation	15
14	Safeguarding Military Information	1
15	Operations Orders	1
16	Terrain Familiarization	5
17	Primary Flight Training Missions	15
18	Meteorology	15
19	Leadership and Exercise of Command	3
20	Duties of Command and Staff Officers	2
21	Map and Aerial Photograph Reading	5
22	Aviation Communications	8
23	Basic Flight Training Missions	15
24	Observation and Reconnaissance Aviation	10
25	Advanced Flight Training Missions	20
26	Special Flight Training Missions	20
27	Airplane Inspection	6
28	Duties of Servicemen	5
29	Military Correspondence	2
30	Physiological Aspects of Flying and Maintenance of Physical Fitness	5

2. Command and Staff Officers of the Civil Air Patrol are required to take the courses of instruction covered by Training Directives No. 14, 15, 16, 19, 20, 21, 22, 24, and 29. Pilots and Observers are required to take the courses covered by Training Directives No. 13, to 26, inclusive, and No. 30. Maintenance personnel are required to take the courses covered by Training Directives No. 14, 27, and 28. Servicemen are required to take the courses covered by Training Directives No. 14 and 28.

3. Instruction in the Specialized Courses may be carried on concurrently with instruction in the Basic Courses.

4. Credit for Previous Training. In cases where members of the Civil Air Patrol have had sufficient previous training in any of the subjects covered by the Training Directives to qualify them to demonstrate they have mastered the subjects in question, entry to this effect shall be made on their Service Record Cards and report made to National Headquarters on the Monthly Service Reports, forwarded through channels. Such members shall then be considered as having satisfactorily completed said courses of instruction.

TRAINING DIRECTIVE No. 1
MILITARY COURTESY AND DISCIPLINE

1. General

The success of the Civil Air Patrol in carrying out its missions as a volunteer defense organization depends upon the loyalty, steadfastness and teamwork of alert men and women of civil aviation who, in the spirit of team-play, are willing to put the interests of the "team" above their own in order that the "team" might win. Such teamwork, and the morale and high devotion to duty which go with it, calls for the voluntary self-discipline, cheerful obedience to the will of the leader, and consideration for others which constitute the basis of military discipline and courtesy as practiced in the defense forces of the United States.

2. Text

War Department Basic Field Manual, Military Courtesy and Discipline, FM 21-50, has been adopted as the text to be used for instruction in this subject.

3. Distribution of Text

Copies of this Manual will be distributed to units of the Civil Air Patrol on the basis of one copy for five members.

4. Requirement

Unit Commanders are hereby requested to make a special effort to see that all members of their commands are given through instruction in the subject matter covered by this Manual.

5. Instruction Procedure

It is recommended that the services of capable volunteer instructors be enlisted to give classroom instruction and conduct discussion forums in such manner as to insure effective training.

6. Service Records and Reports

Satisfactory completion of courses of instruction by members of the Civil Air Patrol shall be entered on their respective Service Record Cards and reported to National Headquarters on the Monthly Service Reports forwarded through channels. This procedure applies to all Civil Air Patrol instruction courses.

TRAINING DIRECTIVE No. 2
INFANTRY DRILL REGULATIONS FOR FOOT TROOPS WITHOUT ARMS

1. General

The ease of movement from place to place, the precision of action, and the general efficiency of units of the Civil Air Patrol will be greatly increased by thorough instruction in the fundamentals of Infantry Drill. Well-drilled units present a pleasing appearance when participating in parades or other public ceremonies and possess a pride of organization and a spirit of cohesion which are very enhancing to the morale of the organization.

2. Texts

(a) War Department Basic Field Manual, Infantry Drill Regulations, FM 22-5, has been adopted as the Civil Air Patrol text on Infantry Drill. The following chapters are particularly applicable to foot troops without arms and shall be used for this course of instruction:—Chapter 1, Chapter 2, Chapter 3—Sections VI and VII, Chapter 4, and Chapter 9.

(b) War Department Basic Field Manual, Military Training, FM 21-5, has been adopted as the basic manual for the information and guidance of Civil Air Patrol instructors.

2. Organization

The first step should be the organization of the Crash Crew and the delegation of authority so that one person will be in a position to make quick decisions and give necessary orders and all others will understand who is in charge. It is suggested that the Engineering Officer be in charge of the Crash Crew and be responsible for its training. The Line Chief should be second in charge and other Crew Chiefs designated as alternates so that in the event of a crash, immediate action will take place. The Crash Crew should be made up of men who are on the line or around the hangar. Two automobiles or trucks should be designated as crash vehicles and drivers should be assigned to each. There should be at least one member, who is experienced in first aid and who has completed the First Aid Course, assigned to each vehicle. All members of the Crash Crew who have not completed the First Aid Course will do so as soon as possible. There should be assigned to each crash vehicle one Fire Fighter who thoroughly understands extinguishing gasoline and oil fires. There should also be assigned to each crash vehicle one experienced Metal Worker and helper. Duties of the various members of the Crash Vehicle Crew are discussed in detail in another paragraph.

3. Preparation

It is important to have emergency telephone numbers posted conspicuously in the hangars, Operations Offices and in other prominent places. This is particularly important at a new location. Suitable placards should be prepared listing—

Emergency Telephone Numbers

Fire Department	Hospital
Police Department	Doctor
Sheriff's Office	Coast Guard
Army Operations	Navy Crash Boat

Alarm: There should be a suitable alarm signal which will be sounded in the event of a crash. An automobile siren or a steel wagon tire and iron bar will do.

4. Fire Extinguishing—Flammable Liquid Fires

a. The usual method of extinguishing flammable liquid fires (gasoline, organic solvents and light fuel oils) requires the use of an agent which will have a blanketing effect on the fire. Oxygen is excluded from the burning material by forming a layer of non-inflammable gas or foam between the material and the air. Foam, carbon dioxide, and carbon tetrachloride are satisfactory for this purpose. Water should not be used on this type of fire except in the absence of the mentioned types of extinguishers. If it is used, it should be applied as a spray. A stream of water causes the burning liquid to spatter, thereby spreading the fire, while fine sprays tend to cool the liquid surface and exclude the air.

b. Foam type extinguishers may be obtained in sizes which vary from 2½ to 40 gallons. The amount of foam which may be produced is about ten times the rated volume capacity. Foam streams should not be played into burning liquids, for the foam then emerges covered with the blazing liquid. The foam should drop gently on the surface of the liquid in order to form a smothering blanket.

c. The carbon dioxide type commonly comes in sizes containing two to twenty pounds of the liquid which is under pressure. One pound of the liquid carbon

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TRAINING DIRECTIVE No. 4
FIRST AID COURSE FOR CIVILIAN DEFENSE

1. General

Many lives may be saved and many disabilities prevented by intelligent first aid treatment given in case of injury or sudden illness before the services of a physician can be secured. In all cases proper first aid measures reduce suffering and place the patient in the physician's hands in a better condition to receive treatment. In order that the Civil Air Patrol may be prepared to meet emergency situations as they arise, each member of the Patrol is hereby charged with the responsibility of taking the First Aid Course for Civilian Defense, prepared by the Amercan National Red Cross, in collaboration with the Office of Civilian Defense.

2. Course of Instruction and Text

The First Aid Course for Civilian Defense is a twenty-hour course very similar to the Standard First Aid Course of the American Red Cross. Special emphasis is placed upon the training for those emergencies which are most apt to be met in a country engaged in war, or in case of subversive acts of enemy agents resulting in the injury of large numbers of persons.

The text used is the Red Cross First Aid Textbook. Each student is required to have a copy of this text. These are obtained through the local Red Cross Chapters, and the price is 60 cents each.

In order to provide time for the teaching of new supplemental material on First Aid care for the victims of war gases, and special stretcher training, certain portions of the First Aid Textbook usually taught in the Standard Course are omitted from the class lessons of the Defense Course, but are designated as required assigned reading, and will be covered by the students outside of the regular class periods.

This course, like all First Aid courses of the Red Cross, will be taught only by qualified Red Cross Instructors. Students satisfactorily completing the course under such instructors will receive a suitable certificate. Record of the receipt of such certificates by members of the Civil Air Patrol will be entered on their respective Service Record Cards and reported to National Headquarters on the Monthly Service Reports forwarded through channels.

3. Procedure

All unit commanders are requested to urge the members of their commands to enroll at once with their local Red Cross Chapters for this very important course of instruction.

TRAINING DIRECTIVE No. 5
INTERIOR GUARD DUTY

1. General

As the Civil Air Patrol may from time to time in cases of emergency be called upon to assist in providing for the safety and security of airports, landing fields and other defense property, it is important that the members of the Patrol know and understand the fundamentals of Interior Guard Duty.

2. Text

War Department Basic Field Manual, Interior Guard Duty, FM 26-5, has been adopted as the text to be used for instruction in this subject.

3. Distribution of Text

Copies of this text will be distributed to units of the Civil Air Patrol on the basis of four copies per unit.

4. Requirement

All members of the Civil Air Patrol are required to take this course of instruction.

5. Instruction Procedure

It is recommened that the instructors selected to conduct this course be men with previous military training and experience. In many instances it may be possible to have this course handled by the instructor conducting the course in Infantry Drill Regulations covered by Training Directive No. 2.

TRAINING DIRECTIVE No. 6
PROTECTION AGAINST GAS

1. General

Events abroad have amply demonstrated that civilians as well as a nation's armed forces must be prepared to withstand any means of attack that an enemy may employ. Among these is chemical warfare, commonly known as gas warfare. If war gas were to be used in an attack upon this country, an enemy would probably act without warning in order to exploit the effect to the utmost. It is essential for civilian defense, therefore, that information and training be given in protection against gas. Thorough preparation is the surest way to reduce the number of casualties and perhaps even to discourage use of war gas entirely.

2. Text

The War Department has prepared for the Office of Civilian Defense a special textbook entitled "Protection Against Gas", which covers this subject in a very excellent manner and which has been adopted as the Civil Air Patrol text for this course.

3. Distribution of Text

Copies of this text will be distributed to units on the basis of two copies per unit.

4. Requirement

Unit commanders are hereby directed to see that all members of their commands are given a thorough course of instruction in this subject.

5. Instruction Procedure

As effective instruction in protection against gas calls for a knowledge of chemistry, human anatomy, advanced first aid, medicine and other allied subjects, it is recommended that the instructors selected to conduct this course be enlisted from the ranks of the medical profession.

TRAINING DIRECTIVE No. 7
PROTECTIVE CONCEALMENT

1. General

This course of instruction is for the purpose of familiarizing members of the Civil Air Patrol with practical measures for the concealment of important civilian installations and equipment from aerial observation.

2. Text

The War Department has prepared for the Office of Civilian Defense a special textbook entitled "Protective Concealment", which has been adopted as the Civil Air Patrol text for this course.

3. Distribution

Copies of this Directive and Text will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Civil Air Patrol members are required to take this course.

5. Instruction Procedure

There will be two classroom instruction periods of one hour each devoted to the fundamentals of Protective Concealment as presented in the text. These periods will include lectures, general discussion, and questions covering this subject. It is suggested that where possible the services of Army Engineer Officers (either active or retired) be enlisted as instructors in this course.

TRAINING DIRECTIVE No. 8
CRASH PROCEDURE

1. General

A standard Crash Procedure should be adopted by Civil Air Patrol Squadrons, especially when performing co-operative missions with Army, Navy or any other agency which may base them on an airport away from home and where the usual facilities available at home would not exist on their temporary Air Base.

2. Text

The text material to be used in this course of instruction is presented in the following pages.

3. Distribution

Copies of this directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

All members of the Civil Air Patrol are required to take this course. Engineering Officers will conduct special sectional training in the Engineering Sections for all personnel assigned to emergency Crash Crews.

5. Instruction Procedure

The text is intended as a guide and should be amplified or modified as considered necessary for practical usage within each Squadron. Crash drills will prove valuable after study of the text has been completed. It is recommended that frequent crash drills be practiced.

CRASH PROCEDURE

1. In the event of a crash on the airport, cool, quick, intelligent action is of utmost importance if lives are to be saved. This objective will be most effectively attained through a specially trained, properly equipped Crash Crew. Each member of the crew should have a definite assignment of duty in order that he may proceed to his assigned task without confusion or delay in waiting for instruction.

TRAINING DIRECTIVE No. 12
REVIEWS AND INSPECTIONS

1. General

The purpose of this course is to instruct Civil Air Patrol units in the procedure to be followed in the conduct of reviews and inspections as prescribed for the Army Air Forces.

2. Text

War Department Air Corps Field Manual (FM1-60)—Reviews and Inspections—will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive and Text will be distributed on the basis of four copies per Headquarters.

4. Requirement

All members of the Civil Air Patrol are required to take this course.

5. Instruction Procedure

There will be two one-hour instruction periods which will include general discussion, questions and answers, and practice formations.

TRAINING DIRECTIVE No. 13
AIR NAVIGATION

1. General

It is of prime importance that all Pilots and Observers of the Civil Air Patrol have a sound working knowledge of the fundamentals of Air Navigation, and that they be thoroughly skilled in the practical application of this knowledge to the navigational problems confronting them in the execution of their missions. The lack of such attainments may spell the failure of a mission on which depends the success of some extremely important National Defense operation.

2. Text

Civil Aeronautics Bulletin No. 24—Practical Air Navigation, published by the Civil Aeronautics Administration of the United States Department of Commerce, has been adopted as the Civil Air Patrol text for the course of instruction covered by this Training Directive. Copies of this text may be obtained from the Superintendent of Documents, Washington, D. C., at the price of $1.00 each. This text is not available for free distribution.

3. Requirement

All Pilots and Observers of the Civil Air Patrol are required to take this course of instruction.

4. Instruction Procedure

It is recommended that where possible ground instructors certificated in Air Navigation by the Civil Aeronautics Administration be enlisted to conduct the classes in this subject. No student shall be considered as having satisfactorily completed this course until he has obtained a practical working knowledge of Air Navigation as covered by this text and has become skilled in the use of the Air Navigation Computer in the solution of ground-speed and radius-of-action problems and in the calculations involved in the preparation of complete flight plans.

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dioxide will expand into a gas, occupying 8.6 cubic feet, on release under normal conditions.

d. Carbon tetrachloride extinguishers are available in sizes varying from one quart to three gallons. The streams of both this and the carbon dioxide type should be directed at the base of the flames.

e. For service at airports, crash trucks are generally equipped with four special fifty-pound cylinders of carbon dioxide and a tank holding 250 gallons of the foam solution.

5. Crash Equipment

The following equipment is desirable for the contents of a Crash Kit. If all of this equipment cannot be secured, any portion will be helpful. It is recommended that the crash cars be parked near the hangar apron and marked with red flags and that while standing on duty a Crash Kit be stored in each car.

Contents of Crash Kit

One extra-heavy grappling hook (triple hook) with fifty feet of strong wire cable or heavy chain attached to hook. The free end of the cable or chain should be designed for quick attachment to the draw bar, rear axle or bumper of a truck or automobile.

1 Fire axe, 5" cut
2 Wrecking bars, one with goose neck and one off-set. Both ¾"x30"
1 Bolt-cutter ⅝" capacity
1 Cold chisel ¾" cutting edge
1 Pipe cutter
2 Hand flashlights
1 Flood-type searchlight
1 Machinist's hammer, ball peen, 20 oz.
1 Hunting knife
1 Linesman's pliers, 8" side cutting
1 Blacksmith's sledge, cross peen 6 lbs.
1 Hunter's hatchet 3⅝" cutting edge
1 Pair hand tinner's snips, straight edge, 4" cut
2 24" 15-point hand hack saws
1 Hack-saw frame 8"-12" frame with 12 10" hack-saw blades, 32 point

First Aid Kit

3 5-oz. Tubes Tannoid for Burns
2 4" Bandage-Compress
2 Triangular Bandage
1 Tourniquet and Forceps
2 Wire Splint
2 4"x6 yd. Bandage
2 Gauze Compress
1 5" Bandage Scissors
1 Army type stretcher

6. Procedure

No standard procedure can be prescribed. If a fire breaks out in a crash it is important to remove the crew before fire reaches the tanks. There is also hazard to the rescue crew on account of possible tank explosion. In many instances twisted longerons may block escape from the plane and it may be necessary to saw or chop portions of metal work to release occupants of the plane. Where fire has broken out, grappling hooks may be used effectively to jerk out a door or a seat, or to pull open the airplane structure. Where two planes are locked together in a collision and one of the planes is burning, the crash hooks

may be used effectively to snatch the planes apart before both become involved in the fire. In some cases it may be effective to fasten the crash hooks to opposite sides of the fuselage and have the two automobiles or crash vehicles pull the fuselage apart. Practical mechanics in the Squadron may devise their own method of procedure and teamwork. Every man in the Crash Crew must know his job and the use of the tools assigned to him.

7. Crash Crews

Organization of Crash Crews may be modeled after the following plan, which may be supplemented according to the individual plan of the Crash Officer. This crew is intended to man two Crash Vehicles.

Crash Crew

4 First Aid	2 Driver
2 Fire Fighter	4 Metal Worker

7. Crash Crews

Coolness and precision are important and confusion must be avoided. When the Crash Vehicles arrive at the crash, the Fire Fighters should go into action immediately or stand ready with their fighting apparatus and not attempt to do some other jobs. The drivers should remain seated in their vehicles ready to back into position when needed. The First Aid Men, with the help of the Metal Workers, extricate the occupants of the plane, administer first aid and handle the stretchers.

TRAINING DIRECTIVE No. 9
ORGANIZATION OF THE ARMY

1. General

The purpose of this course of instruction is to familiarize the personnel of the Civil Air Patrol with the organization of the Army of the United States in order that the Patrol may be better prepared for effective service as an auxiliary to the armed forces.

2. Text

Civil Air Patrol Training Manual No. 1—Organization of the Army—will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters. The text will be distributed on the basis of one copy for each member enrolled in the course.

4. Requirement

All members of the Civil Air Patrol are required to take this course.

5. Instruction Procedure

In addition to required individual study of the text, there will be three classroom instruction periods of one hour each which will include lectures, general discussion, and questions covering this subject.

TRAINING DIRECTIVE No. 10
ORGANIZATION OF THE NAVY

1. General

The purpose of this course of instruction is to familiarize the personnel of the Civil Air Patrol with the organization of the United States Navy in order that the Patrol may be better prepared for effective service as an auxiliary to the armed forces.

2. Text

Civil Air Patrol Training Manual No. 2—Organization of the Navy—will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters. The text will be distributed on the basis of one copy for each member enrolled in the course.

4. Requirement

All members of the Civil Air Patrol are required to take this course.

5. Instruction Procedure

In addition to required individual study of the text, there will be two classroom instruction periods of one hour each which will include lectures, general discussion, and questions covering this subject.

TRAINING DIRECTIVE No. 11
ORGANIZATION OF THE ARMY AIR FORCES

1. General

The purpose of this course of instruction is to familiarize the personnel of the Civil Air Patrol with the organization of the Army Air Forces in order that the Patrol may be better prepared for effective service as an auxiliary to the armed forces.

2. Text

Civil Air Patrol Training Manual No. 3—Organization of the Army Air Forces —will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters. The text will be distributed on the basis of one copy for each member enrolled in the course.

4. Requirement

All members of the Civil Air Patrol are required to take this course.

5. Instruction Procedure

In addition to required individual study of the text, there will be two classroom instruction periods of one hour each which will include lectures, general discussion, and questions covering this subject.

TRIM ON THIS LINE

TRAINING DIRECTIVE No. 15
OPERATIONS ORDERS FOR FLIGHT MISSIONS

1. General

Operations Orders are required for authorizing all flight missions undertaken as part of Civil Air Patrol activity. It is important, therefore, that such orders be clear, concise, and complete to prevent confusion. The basic procedure to be followed is set forth herewith.

2. Text

The text material to be used in this course of instruction is presented in the following pages.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Command, Staff and Flight personnel are required to take this course. It is desirable that other personnel also be familiar with the text.

5. Instruction Procedure

After each member concerned has read and thoroughly understood the text, a conference will be called for classroom instruction, which will include a general discussion and working out of details of procedure.

OPERATIONS ORDERS FOR FLIGHT MISSIONS

1. General

Operations Orders are the channels through which orders for one or more flight missions are translated from plan to practice. In addition, these orders constitute a record and give authorization. As such they should have all the necessary information without unnecessary details and should be specific.

2. Form

Attachment A shows the basic form in which Operations Orders will be prepared. Attachment B shows the short form which may be used by Squadrons for routine training missions completed in one day. Attachments C, D, E and F are sample Operations Orders.

3. Numbering

Operations Orders will be numbered consecutively.

4. Contents

Every Operations Order should explain who, when, where, what and how.

a. **Who:** Units or personnel and planes which will execute the mission. Unit numbers will be used, i. e. Wing 81, Group 815, Squadron 815-3, Flight 815-3B. Planes will be referred to by NC numbers, i. e., NC 1111 not Aeronca NC 1111. Individuals will be referred to in the body of the Order by rank, initials and last name (preferably written in capitals). Given names will be spelled out if necessary to prevent confusion. For example, Squadron Commander MALTA. Use FRANK SMITH and FRED SMITH to distinguished between two F. SMITHS.

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TRAINING DIRECTIVE No. 14
SAFEGUARDING MILITARY INFORMATION

1. General

The ENEMY wants the information you have and is ever on the alert to pick it up wherever it may be found. A careless word dropped in an unsuspecting moment may be all that is needed to complete piecing together the jig-saw puzzle on which some enemy agent is working, and thus give him information that will lead to the defeat of an important Allied undertaking. The loss or disclosure of military information is a very serious offense, particularly so in time of war.

2. Text

The War Department has issued regulations (Army Regulations No. 380-5) covering the subject of "Safeguarding Military Information." The excerpts from these regulations presented in the following pages have been adopted as the Civil Air Patrol text for this course.

3. Distribution

Copies of this Training Directive will be distributed to units on the basis of four copies per unit.

4. Requirement

Unit Commanders are hereby directed to see that all members of their Command are given a thorough course of instruction in this subject.

5. Instruction Procedure

It is recommended that, where possible, the instructors enlisted to conduct this course be men with experience in military intelligence, such as S-2 officers of small units or G-2 officers in a division or higher unit.

EXCERPTS FROM ARMY REGULATIONS No. 380-5
SAFEGUARDING MILITARY INFORMATION

1. Classified military information—Classified military information includes all information concerning documents, cryptographic devices, development projects, and materiel classified as **secret**, **confidential**, or **restricted**, as well as the items themselves. All other military information, documents, development projects, and materiel are regarded as unclassified.

2. Responsibility—Classified military information will be discussed only with military or civilian personnel having a legitimate interest therein.

3. Right to possess classified military information—No person in the military service or employed by it is entitled to classified military information solely by virtue of his commission or official position. Such information will be entrusted only to those who need it in the perfor[illegible]f their official duties.

4. Oral discussions of classified milita[illegible]ormation—Either public or private discussion of classified military information by members of the military service with or in the presence of unauthorized personnel is strictly forbidden.

5. Dissemination of secret matter—The dissemination of secret matter will be held to the absolute minimum. Information as to the contents or whereabouts

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of secret matter will be disclosed only to those persons whose duties require such knowledge. It is exclusively for the official use of the person to whom it is divulged or issued, who will be responsible for its safe custody and security. Its inviolability is the duty and responsibility of all persons having knowledge thereof, no matter how obtained.

6. Dissemination of confidential matter—Confidential military information will neither be discussed with nor disclosed to unauthorized persons. The contents or whereabouts of confidential documents, cryptographic devices, or materiel will be disclosed only to those persons in the Government service whose duties require that they have such knowledge and to such other persons of especial trust who must be informed. Those to whom confidential information is entrusted or disclosed are responsible for its safe custody and security.

7. Dissemination of restricted matter—The information contained in restricted documents and the essential characteristics of restricted materiel will not be communicated to the public or to the press, but may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are co-operating in Government work.

8. Clerical and technical work on secret and confidential matter—Clerical and technical work on secret and confidential matter will be performed only by trustworthy personnel.

9. Preparation for transmission—Except when personally delivered by authorized personnel, secret documents transmitted from one person to another will be inclosed in an inner and an outer cover. Typewritten matter in the document will be protected by a cover sheet, or by a method of folding, from direct contact with the inner cover. The inner cover will be a sealed wrapper or envelope addressed in the usual way but plainly marked secret so that the notation will be seen when the outer cover is removed and will contain a receipt form which will identify the addressor, the addressee, and the document. The outer cover will be sealed and addressed in the ordinary manner with no notation to indicate its secret classification.

Prior to opening a sealed package or envelope containing secret documents, the seals and wrappers will be carefully inspected to determine whether there has been any tampering. If any evidence of tampering is noted, the facts will be reported immediately to the issuing authority, who will initiate an investigation without delay.

The inner cover marked **secret** will be opened only by the person to whom addressed or by personnel specifically designated by him. The receipt form will be dated and signed and immediately returned to the sender. The inner cover will be destroyed by burning if the subject matter of the inclosure has been in contact therewith.

A confidential document will be prepared for transmission in the same manner as a secret document except that the inner cover will contain a receipt form only when the sender deems it necessary and may be opened by any responsible person authorized by the addressee.

10. Transmission of classified documents—Within the United States and its possessions, secret documents will be transmitted by an officer-messenger or courier when practicable, otherwise by United States registered mail.

Secret documents, except those used by Air Corps personnel during flight, will

be transported by aircraft or by registered air mail only under exceptional circumstances when, in the opinion of one of the authorities designated in paragraph 13a, the emergency demands it. When transmitted by military aircraft they will be securely wrapped and placed in the custody of an officer other than the pilot. When the flight of the military aircraft is to be made over water the document will also be weighted.

Confidential documents will be transmitted by an authorized messenger, insured express, or registered mail to any point in the United States and its possessions, provided they do not pass through a foreign postal system and are carried in ships of United States registry.

Confidential documents, except those used by Air Corps personnel during flight, will be transported by military aircraft or by registered air mail only when in the opinion of the responsible officer, the emergency demands it.

Restricted documents may be transmitted by any authorized messenger, or by ordinary mail, express, or freight to any point in the United States and its possessions, provided they do not pass through a foreign postal system and are carried on ships of United States registry.

11. Storage of classified documents—Secret and confidential documents, other than registered documents, will be stored in the most secure files available in a room that is kept locked when not in use. Restricted documents will be stored and handled in such a manner as to insure a reasonable degree of security.

12. Destruction of classified documents—a. Secret and confidential documents.

(1) When competent authority directs the destruction of secret or confidential documents, they will be burned in the presence of an officer, who will submit a certificate of destruction to the headquarters concerned. If the documents are registered, the certificate will be sent to the officer directing the destruction, who will forward it to the office of record indicated in the registered document.

(2) Preliminary drafts, carbon sheets, plates, stencils, stenographic notes, and work sheets containing secret or confidential data will be destroyed by the person responsible for their production immediately after they have served their purpose or will be given the same classification and safe-guarded in the same manner as the materiel produced from them.

b. Restricted documents—Restricted documents will be destroyed in any convenient way which will render them useless.

13. Authority to classify military information—a. Authority to classify as secret.—Matters may be classified as **secret** only by or by authority of the Secretary of War; the Under Secretary of War; an Assistant Secretary of War; the Chief of Staff, or an Assistant Chief of Staff of the War Department General Staff; a chief of arm, service, or the National Guard Bureau; a general officer; the commanding officer of a depot, post, camp, or station; the commandant of a general or special service school; or a military attache.

b. Authority to classify as confidential.—Documents, development projects, materiel, or technical information may be classified as **confidential** by any commissioned officer.

c. Authority to classify as restricted.—Documents, development projects, technical data, and materiel may be classified as **restricted** by any commissioned officer.

in the September, 1942 issue.

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ATTACHMENT E
Example of Squadron Operations Order

CIVIL AIR PATROL
Headquarters Squadron 739-5

OPERATIONS ORDER) X-VILLE, MISSOURI
No. 25) FEBRUARY 20, 1942

1. a. Flights 739-5H, 739-5A, 739-5B will fly in Squadron formation from X-ville to Fayette starting at 10:00 March 1st.

b. The return flight will start at 14:00 from Fayette.

2. Personnel and planes used will be as follows:

FLIGHT	PILOT	OBSERVER	NC.
H	*Squad. Com. JONES	D. BROWN	1111
	B. KEEN	E. ROBINSON	2222
	C. DUNCAN	F. WILLIAMS	3333
A	H. JENKS	L. RUTLAND	4444
	J. BOSTON	M. WALTERS	5555
	K. ROBINSON	N. COHEN	6666
B	A. ROLLINS	D. MATHEW	7777
	B. CARTER	E. TRAVIS	8888
	C. ELLIS	F. SMITH	9999

By Order of Squadron Commander A. JONES:
/s/ B. Smith
Operations Officer

Distribution: 3 copies each Flights H, A, B
Reference: Group Operations Order No. 16
*Abbreviation for Squadron Commander

ATTACHMENT F
Example of Squadron Operations Order

CIVIL AIR PATROL
Headquarters Squadron 529-4

OPERATIONS ORDER) Z-VILLE, INDIANA
No. 34) FEBRUARY 26, 1942

1. Pilot A. WALLACE will take off at 8:30 March 1st, fly to Chicago Municipal Airport with documents and return at his discretion on March 2.

2. Personnel and planes used are:

PILOT	CREW	NC
A. WALLACE	NONE	8877

By Order Squadron Commander MAY:
/s/ K. Jones
Operations Officer

Distribution: 1 copy Pilot Wallace
Reference: None

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b. When: Date and time will be given as necessary for departure and return of the mission. The date will be used instead of terms such as: "today," "tomorrow." "Wednesday." When giving a time of day use the 24 hour clock, i. e. 3:10 p. m. is 15:10. Operations Orders referring to units may omit time for departure and return. Orders referring to individuals will either give the time for departure and return or else state such times will be at the individual's discretion. Departure time is the time of takeoff. Time for return is the time of landing.

c. Where: The route or region to be flown over. General terms may be used such as "X-ville to Y-ville." Map co-ordinates will be used if accurate identification is needed. Specific details of the route will be omitted since the pilot is responsible for avoiding danger areas. Names of places will be printed in capital letters.

d. What: Description of the mission including necessary precautions and objectives.

e. How: Description of action to be taken or procedure to be used. When standard methods of action and standard procedures are adopted they will be referred to as Plan A, Plan B, etc., to save unnecessary repetition. For example: "Plan B will be used in taking counter saboteur action."

6. Individual Orders

Individuals will not be named in Operations Orders applying to Groups or Squadrons but will be named when such orders apply to a Flight or to individuals. In this case of the names of pilot, crew members, passengers and the NC number of the plane in which each person will go are indicated.

7. Emergency Procedure

In an emergency, Operations Orders may be transmitted verbally, by telephone, telegraph or otherwise. However, in that event a confirming Operations Order will be prepared as soon as practical, together with a brief paragraph explaining the emergency.

8. Issuance

Operations Orders will be issued only by duly constituted authority. This will be the Unit Operations Officer, or his deputy, representing the Unit Commander. Such delegation of authority will not relieve the Unit Commander of responsibility for issuance of proper Operations Orders. Flight missions undertaken by Command and Staff personnel (including the Operations Officer) will require Operations Orders in the same manner as those of other flight personnel.

9. Distribution

The originals of its Operations Orders will be filed in numerical sequence by each Headquarters. One copy of each order will be distributed as follows:

a. To each Unit and when necessary to each Pilot named in the order.

b. Attached to the Operations Order received from a higher unit in compliance with which the original was issued.

c. To other organizations when necessary for their information.

10. Reference

An Operations Order issued in fulfillment of another Operations Order will refer to the latter and identify it clearly. For example, a Squadron Operations

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Order may state: Reference Group 73 Operations Order No. 65. A Group Operations Order may state: Reference Air Force Order No. 976. If the order originates with the Unit itself, the reference is given as "None."

ATTACHMENT A

BASIC FORM FOR OPERATIONS ORDERS

(Material in parenthesis varies in different cases. Other material is standard)

CIVIL AIR PATROL

Headquarters (Class of Unit) (Number of Unit)
(Locality and state where order was issued)

OPERATIONS ORDER
NO. (Number)

(Date of order)

(Body of order. Number each paragraph. Last paragraph will give names of personnel and NC number of planes when pertinent.)

By Order of (Name and title of Unit Commander):

(Signature of Operations Officer)
(Name and title of Operations Officer)

Distribution. (Number of copies sent to various units. Units are described by number. Individual pilots are named.)

Reference. (Name of Unit and Operations Order number under which this order issued or else word "None".)

ATTACHMENT B

Example of short form of Operations Orders

CIVIL AIR PATROL

Headquarters Squadron 769-2

OPERATIONS ORDER) Z-VILLE, NEBRASKA
NO. 66) MAY 8, 1942

The following missions will be flown:

Date	Plane No.	Crew	Duty	Mission	Takeoff	Land
5/ 8 /42	NC2112	A. Smith	Pilot	Flight Training	10:00	12:00
5/ 8 /42	NC3114	B. Jones K. Brown	Pilot Observer	Flight Training Mission No. 10	11:00	13:20
5/ 9 /42	NC2112	A. Smith C. Kent	Pilot Check Pilot	Flight Training Mission No. 1	9:00	9:30
5/12/42	NC4115	D. Green E. Frank	Pilot Observer	Z-ville to Omaha and return	10:00	14:00

By Order of Squadron Commander WALLACE:

/s/ S. Thomas
Operations Officer

ATTACHMENT C

Example of Wing Operations Order

CIVIL AIR PATROL

Headquarters Wing 73

OPERATIONS ORDER) ST. LOUIS, MISSOURI
NO. 18) FEBRUARY 15, 1942

1. a. Group 739 will provide an observation patrol along the Missouri River from Kansas City to Jefferson from February 25th until further notice during daylight hours.

b. Sabotage activities will be watched for.

2. All Squadrons in Group 739 will have completed formation training flights by March 15, 1942.

By Order of Wing Commander ROE:

/s/ John Doe
Operations Officer

ATTACHMENT D

Example of Group Operations Order

CIVIL AIR PATROL

Headquarters Group 739

OPERATIONS ORDER) SMITHVILLE, MISSOURI
No. 16) FEBRUARY 18, 1942

1. a. Squadron 739-1 will fly an observation patrol along the Missouri River from Kansas City to Boonville from February 25th until further notice. This patrol will be made during daylight hours.

b. Plan B. will be followed in event sabotage is discovered.

2. a. Squadron 739-2 will fly an observation patrol along the Missouri River from Boonville to Jefferson City from February 25th until further notice. This patrol will be made during daylight hours.

b. Plan B. will be followed in event sabotage is discovered.

3. Squadron 739-5 will carry out a training flight in formation from X-ville to Fayette and return on March 1.

4. Squadron 739-6 will carry out a training flight in formation from Y-ville to Van Buren and return on March 1.

By Order Group Commander JONES:

/s/ John K. Doe
Operations Officer

Distribution: 1 copy to Squadrons 739-1, 739-2, 739-5, 739-6
Reference: Wing Operations Order No. 18

of departure to the point of turning back. The Observer will determine and record the position, altitude and ground speed of the plane at ten-minute intervals throughout the flight and will also determine and record the position of the plane at the point of turning back. At the conclusion of the flight the Pilot's estimate will be checked against the actual performance.

3. Elementary Navigation (FTM-3)

The Elementary Navigation Mission requires accuracy in making good a series of true courses and in keeping track of position relative to departure point. The Pilot will fly on an assigned true course for a specified time, which will be at least thirty minutes. At the end of this time, he will fly for a specified period on a second assigned true course which will make an angle with the first of between 45° and 135°. He will then return on a straight course to the point of departure. At ten-minute intervals the Observer will determine and record the location, altitude and ground speed of the airplane. He will also determine and record location of the points where the course is changed. An estimate of the distance covered on each leg and the total flying time will be made by the Pilot, with the assistance of the Observer, before undertaking the flight. Actual time and distance will be checked against the estimate.

4. Selection of Emergency Fields (FTM-4)

Selection of Emergency Fields is an important mission for inexperienced pilots. Each pilot will be required to make a sketch showing the exact location and approximate size of several fields (not airports) suitable for safe landing of the type of airplane he is piloting. There should also be shown obstacles and hazards on or adjacent to the landing area. These sketches should be checked by an experienced pilot for completeness, accuracy and good judgment. After examination from the ground by qualified pilots, the fields found suitable for emergency landings should be spotted on a map in the Operations Office which should be kept up to date.

5. Traffic Observation (FTM-5)

The Traffic Observation Mission consists of observing and reporting on the surface traffic in a specified area. Roads, railroads and waterways may be used. The Pilot-Observer report will show time of observation, location and type of traffic, direction and speed of movement Altitude used will be 3,000 feet. By sending several planes out at the same time, reports can be checked against each other. This mission corresponds closely to route reconnaissance missions performed by Observation Squadrons.

6. Motor Convoy Spotting (FTM-6)

Motor Convoy Spotting will consist of locating one or more distinctively marked cars or trucks that have been dispatching along highways or roads. In the execution of this mission, the general area in which the vehicles are dispatched should be covered thoroughly. Several planes may be sent out at the same time, in which case each plane will be given a specific route to observe. The reports on this mission will be in the form of a sketch or marked map showing the exact location where the vehicle or vehicles were observed, whether they were in motion, and if so, the direction and rate of movement.

7. Terrain Familiarization (FTM-7)

When arriving at a new sector of operations, the first mission ordinarily as-

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TRAINING DIRECTIVE No. 16
TERRAIN FAMILIARIZATION

1. General

Familiarity with terrain has been the key to success in military tactics in countless instances. Intimate knowledge of communication and transportation facilities is especially necessary in these days when war is chiefly a matter of movement and the orderly evacuation of civilians must be co-ordinated with military traffic in a zone of action.

2. Text

The text material to be used in this course of instruction is presented in the following page.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Command, Staff and Flight personnel are required to take this course. It is desirable that other personnel also be familiar with the text.

5. Instruction Procedure

After each member concerned has read and thoroughly understood the text a conference will be called for classroom instruction, which will include a general discussion and working out of details of procedure.

TRAINING TEXT—TERRAIN FAMILIARIZATION

1. Maps Required: Sectional aeronautical charts and such maps as country road maps or highway road maps of the type issued by oil companies.

2. Command, Staff and Flight personnel shall become sufficiently familiar with the maps to enable them to answer general questions relating to the following features in their immediate localities.

a. Airports, including approximate size and nature of landing area, obstructions in vicinity, and availability of service and repair facilities, communications, surface transportation, etc.; also emergency landing fields, beacons, radio range stations, and other aids to air navigation.

b. Location of Army, Navy and Coast Guard stations, State Police control points, and forest fire stations.

c. Roads, including both primary and secondary roads, and such vital points as ferries and bridges.

d. Railroads, including stations, freight yards, important sidings, bridges and tunnels.

e. Rivers, streams, harbors, lakes and other terrain features such as mountains, marshes and wooded areas.

3. If the Civil Air Patrol is to function in any emergency, general knowledge of terrain within a reasonable distance of the unit base is necessary. Military commanders may call upon personnel for such data, therefore, this is an important part of the training program of Civil Air Patrol in preparing for service as an auxiliary to other defense forces.

4. Familiarization flights should be made in connection with map study. Ability to locate a corresponding point on maps of different scales is necessary, as a map made at the scale of 1:1,000,000, for example, ordinarily does not show as much detail as a map made at the scale of 1:250,000.

5. Flight personnel should survey suitable landing areas available as satellite fields where facilities would be available in an emergency for Army Air Forces. Satellite fields should be within fifteen or twenty-five miles of the home airport, where possible, and may consist of suitable landing strips on highway or farm land where removal of fences would create an emergency field. These satellite fields are for dispersal of aircraft during attack. Data assembled on dimensions, location, communications and utility facilities will be kept locked up as secret information. The data on satellite fields should include information on nearest electrical power connection, water facilities for troops, road network, telephone lines, drainage, turf, obstacles, length of runway, and housing facilities in vicinity.

TRAINING DIRECTIVE No. 17
PRIMARY FLIGHT TRAINING MISSIONS

1. General

Primary Flight Training Missions are intended for less experienced Pilots and for the training of Observers. It is suggested that Observers should co-operate with the Pilots in the matter of operating expenses. This, of course, is a matter of arrangement between individuals.

2. Text

There is attached an outline of Primary Flight Training Missions. The Operations Officer will work out the details, making such changes as local terrain, flying restrictions, etc., may necessitate.

3. Distribution

Copies of this directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Pilots and Observers are required to take this course unless already qualified by past experience.

5. Observance of Civil Air Regulations

All flying will be done in accordance with the requirements of the Civil Air Regulations. Permission will be obtained from the Civil Aeronautics Administration for the performance of any missions that may require a waiver.

6. Operations Orders

The Operations Officer will issue an Operations Order for each of these training missions.

7. Pilot-Observer Reports

a. The crews will submit Pilot-Observer Reports covering each mission. On observation and reconnaissance missions these reports will include such information as the following:

(1) What seen (kind and number of units).

(2) When seen.

(3) Where seen.

(4) Direction of movement.

(5) Speed of movement.

(6) Activities in which engaged.

b. Special emphasis will be placed upon thoroughness and accuracy of observation and upon accuracy and clarity in the preparation of reports.

1. Flight Plan (FTM-1)
2. Radius of Action (FTM-2)
3. Elementary Navigation (FTM-3)
4. Selection of Emergency Landing Fields (FTM-4)
5. Traffic Observation (FTM-5)
6. Motor Convoy Spotting (FTM-6)
7. Terrain Familiarization (FTM-7)
8. Message Dropping (FTM-8)
9. Rescue Mission (FTM-9)
10. Tracking Mission (FTM-10)
11. Search Mission (FTM-11)
12. Rendezvous Mission (FTM-12)

DESCRIPTION

1. Flight Plan (FTM-1)

The Flight Plan Mission involves: (a) Preparation and filing of a complete flight plan covering the three legs of a triangular course; (b) Execution of the flight in accordance with the plan; (c) Determination and recording of the position, altitude and ground speed of the airplane at ten-minute intervals by the Observer; (d) Preparation of Pilot-Observer Report; and (e) Checking of actual flight time over each leg of triangle against estimated time. The mission will be flown at an altitude of 3,000 feet above ground, will require at least ninety minutes flying time, will include landings at each apex of the triangle, and will follow a direct route between landing points. The estimates of flying time will, in each case, cover the period from ground to ground and will not include any allowance of time for navigational or other errors. The Observer will assist the Pilot preparing the estimate.

2. Radius of Action (FTM-2)

The Radius of Action Mission consists of flying at an assigned altitude on a given true course the maximum distance which will still permit the plane to return on the reciprocal course to the starting point at the end of a specified total lapsed time. Before undertaking the flight the Pilot, assisted by the Observer, will prepare an estimate of the fuel to be used and the distance from the point

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conferences will be called for classroom instruction, which will include general discussions and question-and-answer periods.

DUTIES OF COMMAND AND STAFF OFFICERS

1. a. **The Commanding Officer** of a unit is responsible for all matters within his command. He is held solely responsible for training, discipline, administration, supply and operations. In order to provide the commanding Officer with assistance in meeting these responsibilities and with certain specially skilled advisors, he is given a Staff. Members of that Staff do not exercise command in their own name and the orders which they may issue are issued in the name of, or by order of, the Commanding Officer. The various Staff Officers relieve the Commanding Officer of detail work by gathering, arranging, and estimating for him such material and data as he requires to reach the decisions involved in carrying out the responsibility of his command. The Staff Officers will function further in their specific fields as representatives of the Commanding Officer to see that his decisions and orders are being carried out properly. Much staff work is accomplished by inspections of the various units within the command. These inspections are made both by the Commander and by Staff Officers.

b. It is an obvious duty of a Staff to be thoroughly familiar with orders and directives received from higher authority and to see that they are properly executed. This is an administrative detail and it should not be allowed to interfere with the planning and other creative work of the Staff, the objective of which is to fit the command to meet whatever responsibilities may be placed upon it. A Staff should aid the Commander in carefully estimating his potential local problems and, within the general policies laid down from above, prepare plans and training program and required material for whatever may be foreseen.

2. **The CAP Wing Command.** Each CAP Wing has boundaries coterminus with the state after which it is named. The Wing Commander is fully responsible for all CAP matters within his Wing, both tactical and administrative. As outlined in paragraph 1 above, the Wing Commander will utilize his Wing Staff to assist him in meeting these responsibilities and a proper distribution of work among the Wing Staff members is required if the responsibilities are to be fully and efficiently met. The Wing Staff is to aid the Wing Commander in preparing plans for the Wing and subordinate units and to see that those plans are properly carried out throughout the Wing. A Wing Medical Officer, for instance, is interested in the progress and efficiency of Group Medical Officers and aids them in conducting properly the responsibilities of their office.

3. **The Group.** In addition to functioning as a part of the planning and administrative staff of the Group Commander, each Group Commander and his Staff have responsibilities similar and parallel to those outlined previously. It will be noted that as we progress further down the chain of command into the lower echelons, there is less responsibility for policy determination and interpretation and a heavier requirement for detail execution of specific instructions emanating from higher ranks. The Group Commander and his Staff, under the directives emanating from the Wing, guide and assist the Squadron Commanders in preparing for and executing the responsibilities charged to their organizations, both in training and in the conduct of missions. Here again the Staff plans, co-operates and inspects, first as a group and then as individual Staff members, in the specific field in which their primary responsibility lies.

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signed to pilots of tactical squadrons is to become familiar with the terrain in the vicinity of the new base. This procedure is simulated in the Terrain Familiarization Mission. The Pilot-Observer team on a flight over the territory within thirty miles of their base will make a sketch showing all outstanding cultural and geographical landmarks which would be of importance to a pilot in orientating himself with reference to the airport in conditions of low visibility. Preparation of the sketch will be done by the Observer with the Pilot's assistance.

8. Message Dropping (FTM-8)

Message dropping should be practiced with small message bags made of heavy cloth, three inches wide by six inches deep with a handful of sand in the bottom and a cloth streamer, approximately five feet long, attached. Accuracy in the dropping of these messages should be stressed. Messages should not be dropped by inexperienced pilots at altitudes below 200 feet. Waiver from Civil Aeronautics Administration is necessary in dropping objects from planes.

9. Rescue Mission (FTM-9)

The Rescue Mission simulates search for a lost aircraft and determination of best approach to the scene of the accident for rescue parties. The lost aircraft will be represented by a yellow cloth or other marker placed in a relatively inaccessible spot. Within ten miles of this spot, a landmark appearing on the sectional charts will be chosen. The Pilot-Observer team will search the area in a ten-mile radius of the landmark, flying at an altitude of not less than 500 feet above the ground or higher if necessary for safety. On finding the marker, the Observer, with the help of the Pilot, will make a sketch showing: location of the simulated accident, type of terrain (woods, swamps, hills, open country, etc.), distance and direction to nearest good road, what roads to take from nearest town or village, location of nearest terrain suitable for aircraft landing, outstanding aerial landmarks, and other information needed for prompt rescue.

10. Tracking Mission (FTM-10)

The purpose of the Tracking Mission is to develop accuracy in making good a zigzag track. In addition, it may be used to train aircraft spotters. A specific route will be laid out to pass over a number of designated points which do not lie in a straight line. When the mission is carried out in co-operation with the aircraft spotter service, the route will ordinarily pass over the maximum number of spotter stations. The Pilot will fly the mission at an assigned altitude and will make a straight track between the specified points. The Observer will record altitude and time when passing over each point and will also record any substantial variation of the actual track from that specified. His report may be forwarded to the spotter service if desired. In some defense areas, approval of the Army must be obtained prior to flight.

11. Search Mission (FTM-11)

The Search Mission gives practice in methodically searching an area. In a rectangle approximately twenty miles long and ten miles wide, about a dozen objects will be placed. These may be cloth strips on top of a parked automobile, on a roof or on the ground. To insure search of the entire area, the exact number of objects to be found will not be known to the Pilot-Observer team. The Observer, with the assistance of the Pilot, will record the location of each object and the

time it was found. A suitable time limit will be imposed for completion of the mission. The minimum altitude flown will be not less than 500 feet above the ground and as much higher as necessary for safety.

12. Rendezvous Missions (FTM-12)

Rendezvous Missions will consist of dispatching several pilots in various directions with a designated rendezvous point, the object being to have all pilots meet at this point at a certain time and altitude. Rendezvous missions are exceptionally valuable for the inexperienced pilot, as they afford a positive test for his navigation and timing ability, and are, of course, similar to the rendezvous missions performed by tactical Squadrons. Pilot and Observer will be required to compute time, distance, speed, wind, etc., prior to takeoff.

TRAINING DIRECTIVE NO. 18
METEOROLOGY

1. General

The successful execution of flying missions frequently depends upon accurate judgment of weather. To obtain this accuracy in judgment, a thorough working knowledge of meteorological phenomena is required. This knowledge is necessary in judging the factors involved in determining the best course to follow when flying in stormy weather, the cruising altitude with the most favorable winds, whether weather conditions will permit flight to be continued, etc. It is important that all Civil Air Patrol Pilots and Observers have a thorough training in Meteorology.

2. Text

Civil Aeronautics Bulletin No. 25, Meteorology for Pilots, published by the Civil Aeronautics Administration of the United States Department of Commerce, has been adopted as the Civil Air Patrol text for the course of instruction covered by this Training Directive. Copies of this text may be obtained from the Superintendent of Documents, Washington, D. C., at the price of 75 cents each. This text is not available for free distribution.

3. Requirement

All Pilots and Observers of the Civil Air Patrol are required to take this course of instruction.

4. Instruction Procedure

It is recommended that where possible, ground instructors certificated in Meteorology by the Civil Aeronautics Administration be enlisted to conduct classes in this subject. No student shall be considered as having completed this course until he has obtained a practical working knowledge of Meteorology as covered by this text and has a thorough grounding in use of teletype and weather map symbols, recognition of cloud forms and knowledge of the weather usually accompanying them, changes in wind velocity and direction with altitude, kind of weather accompanying different air masses and fronts, location of different kinds of weather in cyclones, and elements of forecasting.

TRAINING DIRECTIVE NO. 19
LEADERSHIP AND EXERCISE OF COMMAND

1. General

The primary purpose of this course of instruction is to give Command and Staff Officers and Flight Personnel of the Civil Air Patrol an understanding of the fundamentals of Military Leadership and Exercise of Command.

2. Text

Civil Air Patrol Training Manual No. 5—Leadership and Exercise of Command, will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters. The text will be distributed on the basis of one copy for each member enrolled in the course.

4. Requirement

All Command and Staff Officers and all Flight Personnel are required to take this course. It is desirable that other personnel also be familiar with the text.

5. Instruction Procedure

In addition to required individual study of the text, there will be three classroom instruction periods of one hour each which will include lectures, general discussion, and questions covering this subject.

TRAINING DIRECTIVE NO. 20
DUTIES OF COMMAND AND STAFF OFFICERS

1. General

The purpose of this course of instruction is to give to each officer of the Civil Air Patrol a practical working knowledge of his duties and responsibilities and an appreciation of the manner in which his work should fit together with the work of his associates to round out an organization capable of doing an effective defense job.

2. Text

The text material to be used in this course of instruction is presented on the following pages.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Command, Staff and Flight Personnel are required to take this course. It is desirable that other personnel also be familiar with the text.

5. Instruction Procedure

After each member concerned has read and thoroughly understood the text,

TRIM ON THIS LINE

9. Duties of the Operations Officer. a. He is the direct assistant of the Commander in the training and in the direction of tactical operations of the unit.

b. He co-ordinates the efforts of each department of the unit in such a manner as to avoid confusion and insure proper completion of assigned missions.

c. He acts as the tactical adviser to all flying personnel of the unit and is responsible for their tactical instruction.

d. He assigns missions and gives or prescribes such instructions as are necessary to insure the satisfactory completion of every mission.

e. He is responsible that the proper liaison is conducted with other Arms and Services and that effective co-operation is maintained with the other units of the command.

f. He is responsible that the Commander is continually advised as to the status of the Training Schedule as outlined in Training Directives. In this connection he should maintain proper charts showing the percentage of completion of the Training Schedule.

g. He will verify the qualifications of newly assigned flying personnel to determine their proficiency and abilities as shown by records, and recommend assignment and training.

h. He will maintain an adequate Bulletin Board whereon all available tactical information of interest to the unit personnel is posted.

i. He will maintain a file containing operations instructions covering all available information pertaining to the operations and flying of aircraft. This file must be brought to the attention of all flying personnel and initialed by them after being read.

j. He is responsible for the proper training of sufficient enlisted personnel in operations procedure and in the proper preparation of the prescribed reports and records to insure the efficient operation of his section under all possible conditions.

k. He will maintain close contact with the Operations Officer in units above and below his and should confer with them frequently, regarding the future missions to be assigned to his unit, in order that he may be assured that his personnel are properly prepared.

1. He will issue such orders, relative to operations matters, as may be directed by the Commander.

m. He is responsible for the following routine matters:

(1) He will confer with the Unit Commander relative to the work and missions of the unit and will then prepare the necessary flight and training schedule therefor.

(2) He will insure that all missions are executed at the time scheduled and that the personnel are properly prepared to perform the mission assigned. He will require a report from the personnel thereon after the completion of each mission.

(3) He will check and sign log books of pilots in his specific unit and is responsible for compliance with CAA, Army and Navy regulations.

(4) He will enter the flying time of flying personnel in his specific unit on such charts as may be pertinent.

(5) He will determine the requirements and availability of aircraft.

(6) He will keep operational records such as forced landings, crashes, periodic

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4. The Squadron. In the Squadron Staff, designations are: S-1, Personnel; S-2, Intelligence; S-3, Operations and Training; S-4, Supply. These are four key Staff Officers. In addition, there are usually special Staff Officers such as, Communications, Transportation, and under combat conditions there might be an Armament Officer, a Photographic Officer, a Mess Officer, etc.

5. Staff Relations. a. The Commander has a Staff to assist him in the proper command functions with which he is charged. All correspondence, orders, etc., whether they are related to supply, missions, or training, are addressed to the Commanding Officer because he is responsible for everything. Therefore, he sees all correspondence and his Adjutant marks it for the proper Staff Officer (to be passed on to the Section Staff Officer through Commander and Executive.) When the Staff Officer takes action, he prepares it for the signature of the Commanding Officer or a designated Staff Officer. This is military procedure. The Commanding Officer should organize his Staff to best advantage and consider the personal qualifications and professional qualifications of men best suited for the Staff. For example, the Operations Officer should be an older, more experienced pilot who will see that inexperienced pilots are not sent on missions beyond their capabilities.

b. The Commander should attempt to keep his policies as definite as possible so that his Staff may handle routine matters without having to discuss each detail with the Commander. Particularly, there should be no misunderstanding as to the degree of authority and responsibility of each Staff Officer. It should be known definitely whose work the Staff Officer is supervising and he should co-ordinate his plans with other Staff members.

c. When the Commander so desires, he may assign more than one staff duty to an officer. For example, during training, one officer may act in the capacity of both Supply Officer and Transportation Officer. Then, if the unit were called upon for active missions, the Commanding Officer might designate a separate Transportation Officer and he might require this Transportation Officer to report to the Supply Officer as his assistant, which would leave Transportation under Supply. Or, the Commander might have Transportation report to the Executive.

d. **The Chief of Staff.** Within CAP, the Executive Officer functions as a Chief of Staff and there shall not be designated a Chief of Staff within a CAP unit. The Executive Officer in all CAP units is the second in command and succeeds to the command in the absence of the Commanding Officer. In business parlance, the Commanding Officer will be the President of a corporation and the Executive Officer the General Manager. While the President is responsible for the enterprise and very largely decides matters of policy, the General Manager is responsible for the operation of the business under those policy determinations and makes such decisions as are necessary within the policy determined. A further discussion of the duties of the Executive Officer and other ranks will be found to follow.

e. **Command Channels.** Normally, the Flight personnel discuss operations with the Flight Commander. The Flight Commander takes the matter up with the Operations Officer and the Operations Officer with his higher authority. It is not military procedure for combat crews to take complaints or suggestions direct to the Commander, nor should the Commander make decisions on such detail matter and state them direct. He should take such matters up through his Staff. If the Commander expects full co-operation from his Staff, he will

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usually talk over operations matters with his Operations Officer, and supply matters with his Supply Officer, rather than ignoring them. There follows a detailed discussion of the individual responsibilities of Commanders and Staff Officers. Each officer should be familiar with the duty relating to his Staff assignment.

6. Duties of the Unit Commander. a. He is responsible for the tactical efficiency of the unit; that as a result of training, both by practical experience and theoretical instructions, all personnel of his unit are capable of performing such missions as may be assigned in a satisfactory manner.

b. He is responsible for the training of all the personnel, both commissioned and enlisted assigned or attached to his organizations for duty; he is responsible that such schools are conducted as may be necessary to train the personnel properly. He is responsible that all Officers within the unit are assigned to duties that they are best qualified to perform.

c. He is responsible for the **preparedness for service** of his organization; that it is properly equipped and ready to move out on proper notice; that as a result of proper training, the personnel are prepared to perform the duties required of them; and that it be an efficient weapon to aid in the defeat of the enemy.

d. He is responsible for the **administration** of his unit; for the discipline therein; for the proper performance of their duties by all of his subordinates, both commissioned and enlisted; for the mess, barracks and adjacent areas; for the clothing of the enlisted personnel; for the health of the command; for the proper preparation and disposition of all correspondence and reports; and for all matters of an administrative nature.

e. He is responsible for all public property assigned or issued for the use of the unit or the personnel thereof; for the proper care and preservation of such property; for the proper use thereof; and he is personally financially responsible for all such property as may be in use in his organization.

7. Duties of the Executive Officer. a. The Executive Officer is also second in command of the unit, and hence temporarily succeeds automatically to the command when the Commanding Officer is absent or otherwise ceases to function.

b. He is the principal assistant and adviser to the Commander. He may transmit the decisions of the Commander to appropriate Staff Officers for preparation of the necessary orders, or transmit them in the form of orders to those who execute them. He is the principal co-ordinating agency of the command. He performs the following specific duties:

(1) Formulates and announces policies for the general operation of the Staff.

(2) Directs and co-ordinates the work of the general special Staff in respect to:
  (a) Activities of the sections within the general and special Staff groups.
  (b) Relations between the general and special Staff groups.
  (c) Relations between the general and special Staff groups and the troops.

(3) Keeps the Commander informed of the situation of the command as to location, strength, morale, training, equipment, supply, and general effectiveness.

(4) Receives decisions from the Commander and takes the following action:
  (a) Makes such additional decisions as may be directed by the Commander and gives necessary instructions to the Staff in furtherance of these decisions.
  (b) Allots the detailed work of preparing plans and orders, and when time permits, co-ordinates the resulting drafts and submits them to the Commander for approval.

(5) Takes steps to insure that all instructions published to the command are in accord with policies and plans of the Commander.

(6) By personal observation, and with the assistance of the general and special Staff sections, sees that orders and instructions of the Commander are executed.

(7) Makes a continuous study of the situation with a view of being prepared for future contingencies.

(8) Assembles routine Staff section reports and after their approval by the Commander, forwards required copies to higher headquarters.

(9) In general, the Executive Officer meets the administrative functions for which the Commanding Officer is held responsible and does so in the name of the Commanding Officer.

8. Duties of the Adjutant—S-1. a. The Adjutant handles all routine correspondence, except that pertaining to orders and instructions concerning operation missions, in accordance with regulations and approved policies of the higher command and his Commander. In cases for which no policy has been established, he initiates action to secure from the Executive Officer a policy covering such cases. Again in business parlance, the Adjutant would be the Office Manager operating the detail and routine functions of the office under the General Manager and providing housekeeping functions for the Staff members, such as filing systems, clerical help, stationery and supplies. His detailed duties include the following:

(1) Authentication and distribution of all orders and instructions except those pertaining to operations missions.

(2) Maintenance of the records for the unit headquarters. (A system of staff section records is essential in order to have information available for:
  (a) Command decisions during operations
  (b) Higher headquarters
  (c) Historical record

(3) Staff sections temporarily retain copies of documents needed in their current work, returning them to the Adjutant for the office of records when no longer needed.)

(4) Custody of the records of all personnel belonging to the command which are not kept in some subordinate unit.

(5) Preparation and submission of reports on strength, casualties, and incidental returns.

(6) Supplying blank forms, publications, and instructional matter furnished by National Headquarters, CAP.

(7) Operation of office procedure as regards administrative matters, including recommendations as to similar arrangements in headquarters of subordinate units.

b. Emphasis should be placed upon the responsibility of the Adjutant as the officer charged with office management and detail.

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form all of the duties that would otherwise be the responsibility of the Supply Officer (S-4). He will work in the closest co-operation with S-4. Specifically, the duties of the Transportation Officer will include:

(1) Procurement, storage, and maintenance of all means of ground transportation, vehicular and otherwise, required for the use of his unit.

(2) Transportation of personnel and supplies by land and water.

(3) Traffic control including a map and route designations for road movements. Convoy rules.

(4) Recommendations to the Commanding Officer on all matters relating to ground transportation.

(5) Construction and maintenance of roads, trails, and docks.

(6) Organization and training of the transportation section of his unit and supervision of that of subordinate units.

(7) He will see that his drivers have licenses.

16. **Duties of the Personnel and Medical Officer.** The Medical and Personnel Officer is responsible for the mental and physical fitness of his unit, and for keeping the personnel records. Specifically, his duties include operation, in accordance with approved policies, of activities of headquarters pertaining to:

a. Classification of all individuals joining the unit, their subsequent assignment, reclassification, reassignment, their promotion, transfer, retirement, and discharge.

b. Procurement and replacement of personnel.

c. Leaves of absence and furloughs.

d. Recreation and welfare and all other morale matters not specifically charged to other agencies.

e. Report to Commanding Officer on discipline and attitude of personnel.

f. Closest co-ordination throughout with the Adjutant. (S-1.)

g. When desired, personnel matters may be separated from medical by the appointment of an assistant adjutant, who is usually called the "Unit Personnel Officer".

17. **Duties of the Photographic Officer.** The Photographic Officer is responsible for the training and assignment of duties of the personnel in the Photographic Section. While cameras are not permitted in planes or on many airports, the enthusiasm and training in photography should be carried on with the view that the unit may be requested at some time to perform aerial photographic missions. It is desirable to enroll amateur photographers in this section.

18. **Duties of the Deputy Staff Officer.** The Deputy Staff Officer is the assistant to the Squadron Staff Officer in the section to which he is assigned. He should be assigned from a flight with particular ability for the duties in the section to which assigned. When so desired by the Commander, he may attend Staff Meetings in the absence of the Section Staff Officer. Normally, Deputy Staff Officers are assigned duty only in the Squadron.

19. **Duties of the Flight Deputy.** The Flight Deputy is next in command to the Flight Leader in his Flight. He leads the Flight in the absence of the Flight Leader. He assists the Flight Leader in all Flight duties.

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summaries of total hours flown by his unit, and total hours flown on various types of missions.

n. He will maintain a file of all directives and operational orders from higher authority and will be responsible that the subordinate units maintain records of flying and ground training.

o. He will keep an operations map.

p. He will determine weather conditions in areas in which unit is conducting aerial operations.

10. **Duties of the Engineering Officer.** a. Keep the Operations Officer advised as to status of airplanes.

b. Recommend their adaptability and condition for performing missions.

c. In charge of hangar.

d. Supervision of work of all mechanics and crew chiefs upon the line.

e. See that airplanes are complying with CAA inspection and safety regulations.

f. The duties of the Engineering Officer may be summarized as full knowledge of availability, operating conditions, range and status of airplanes.

11. **Duties of the Flight Commander.** a. The Flight Commander is directly responsible for the indoctrination, discipline, and training of all officers assigned to his flight, and the care and maintenance of all equipment assigned to the flight.

b. The Flight Commander is responsible for the following items:

(1) That each pilot and observer within his flight complies with all training requirements as set forth by higher authority and that a progressive plan of training is employed at all times.

(2) He shall be thoroughly acquainted with each pilot and observer of his flight, knowing the qualifications, limitations and ability, as well as any personal problems that may affect the pilot's proficiency.

(3) He is responsible for the maintenance, inspection and records of all airplanes within his flight.

(4) If separated from his Squadron, he is responsible for housing and messing and all other needs of his officers and men.

(5) He shall keep a written record of the training (air and ground) of his flight and any charts as called for by higher authority.

(6) He will study the deficiencies in technique, ability, and training of his pilots and work toward a higher standard of proficiency at all times. He is responsible for training both air and ground except instructions directly handled by higher authority.

(7) He will take steps to see that all new pilots reporting to his flight are acquainted with Squadron rules and customs and flying regulations.

(8) He will sign all clearances for cross-country flights for members of his flight.

12. **Duties of the Intelligence Officer.** a. Intimate co-operation between the Intelligence Officer (S-2) and the Plans and Training Officer (S-3) is essential. Plans for training and operations depend for their success upon reliable information provided by a good intelligence system. S-2 must know what S-3 wants, and

S-3 must have free access to the information obtained by S-2. The Executive Officer of each unit will co-ordinate S-2 with S-3. Specific duties of the Intelligence Officer insofar as they are pertinent to CAP include:

(1) Providing confidential information for the Unit Commander as requested by him.

(2) Maintenance of contact and exchange of information with intelligence sections of subordinate, higher, and neighboring units.

(3) Evaluation and interpretation of information obtained to determine its probable accuracy, significance, and importance. (Co-ordination with all staff sections.)

(4) Distribution of military intelligence to the Commander, interested staff sections and, when appropriate, to higher, subordinate and neighboring units.

(5) Determination of the need for military maps and surveys; recommendations as to the general character of such maps as are to be produced; supervision of map reproduction and distribution. (Co-ordination with all staff sections.)

(6) Co-ordination of requests for aerial photographs and determination of their distribution.

(7) Planning for and supervision of intelligence training within the unit. (Co-ordination with S-3.)

(8) Handling publicity. (Secures public understanding of the work and purpose of the CAP.)

(9) Supervision of the preparation and use of codes and ciphers.

(10) Responsibility for the safeguarding of classified information.

(11) Securing all information necessary to carry out training and operation missions. (Co-ordination with S-3.)

(12) Reception of visitors at all headquarters, unless this function is otherwise delegated.

(13) Supervision of escorting of visitors.

b. **Interrogation:** When a mission is completed, the Intelligence Officer questions the entire crew on what they saw. This information is posted on a situation map. When military missions are being flown, the Intelligence Officer will keep in contact with the Intelligence Officer of the military unit and transmit to him the information that is learned about any hostile movements, positions, etc.

c. **Counter-Intelligence:** The Intelligence Officer is responsible for the elimination of, and handling of, members of the unit suspected of disaffection, disloyalty, and subversive activities.

13. **Duties of the Supply Officer—S-4.** a. The Supply Officer is charged with the preparation of policies for, and the execution of arrangements for, supply, transportation, and other administrative matters related thereto. He advises the Commander on these matters, and is further responsible for those details of administrative plan which pertain to supply and transportation, the preparation of the necessary orders, and the supervision of their execution. (The CAP organization table calls for a Transportation Officer whose duties are set out below. In case a Transportation Officer is not appointed in a unit, his duties will be assumed by the Supply Officer.)

b. The specific duties of the Supply Officer may include the planning for, and supervision of, activities concerning:

(1) Procurement, storage and distribution of all supplies, including airplanes, except those allotted to the Transportation Officer. (Co-ordination with S-3 for priority of allocation of supplies.)

(2) Location of supply and maintenance establishments.

(3) Maintenance of equipment. (Co-ordination with S-3 for priorities.)

(4) Salvage.

(5) Property responsibility.

(6) Funds and priority of expenditure.

(7) Recommendations as to new types of equipment. (Co-ordination with S-3.)

(8) Procurement of real estate, shelter, and facilities, including their leasing, repair, maintenance, and disposition.

(9) Acquisition and improvement of airplane bases.

14. **Duties of the Communications Officer.** a. The Communications Officer is adviser to the Commander and Staff on all matters concerning communications. His specific duties include:

(1) Preparation of training programs in communications for his unit and subordinate units according to general policies laid down by Commanding Officer. (Co-ordination with S-3.)

(2) Organization and supervision of communication schools. (Co-ordination with S-3.)

(3) Preparation of routine and operational orders relating to communications. (Co-ordination with Staff.)

(4) Preparation, publication, storage, accounting for and distribution of codes and ciphers. (Co-ordination with S-2.)

(5) Determination of requirements, procurement, storage and distribution of communication equipment and supplies. (Co-ordination with S-4.)

(6) Procurement and operation of communication maintenance and repair facilities. (Co-ordination with S-4.)

(7) Technical inspection of communication equipment within limits prescribed by the Commander, and technical supervision of communication operations of the command, including co-ordination of the employment and of the training of communication agencies of subordinate units. (Co-ordination with S-3 on general training program and for general operational matters.)

(8) Supervision of the installation, maintenance, and operation of the communication system, including the message center of the unit.

b. Responsibility for strict compliance that all radio communications are within the prescribed war regulations of both Armed Forces and Federal Communications Commission.

c. He will keep a complete file on all FCC directives pertinent to communications operation in the Squadron.

15. **Duties of the Transportation Officer.** a. The Transportation Officer will be in charge of all ground transportation matters, and in relation thereto per-

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community and, together with his Squadron Commander, should inform them of the existence and function of their local CAP unit. He should also acquaint himself with the managers of the local telephone, telegraph, and radio broadcasting services so that he will know with whom to get in touch in case of emergency. He or his Squadron, Group or Wing Commander should also request a voice in the name of the Civil Air Patrol on his local Defense Council and in the case of Wing Commands on the State Defense Council, informing each of these concerning the duties and function of the Civil Air Patrol.

e. If his unit is asked by the Army Air Forces to perform any specific mission, he should be prepared along with the others of his group to drop whatever he is doing in private life in order to devote all of his time in assisting his unit successfully to carry out the mission. This he should be prepared to do as a patriotic duty to his country. Adequate communication at that time is a vital part of his Patrol Unit and must not fail.

f. It is possible from time to time that his unit may be requested to perform a mission at some point out of range of existing CAA radio facilities. These possibilities will have been investigated at National Headquarters and arrangements will be made to take care of a problem of this nature according to its existing circumstances and he will be informed as to what to do.

g. If he has not done so, he should immediately begin a series of training lectures, preferably in the evening, at some centrally located place where there is a blackboard (school room, Y. M. C. A., etc., in his community). He should assemble all of his personnel, pilots, observers and other interested persons, and in these lectures instruct them how to use existing CAA radio facilities. These instructions should cover all points of aviation radio communications, such as proper calling procedure, filing of flight plans, operation of transmitters and receivers, acknowledgment of instructions transmitted to them by radio, when to call a control tower, the business of maintaining constant watch, and how to handle any and all aviation radio communications problems that may present themselves.

h. These lectures should last from an hour to an hour and a half on several evenings a week and should continue until all members of a unit are thoroughly trained in this important problem. If it will assist certain individuals to identify radio range stations by their transmitted Morse code identification signals, he should ask some local radio amateur to organize a code practice class. This man knows how to do this and will be glad to co-operate.

i. The duties of a Communications Officer are numerous and in co-operation with his Wing, Group or Squadron Commander he should be capable of solving promptly any communications problem that may arise. He should be in complete charge of all communications for his unit, and be entirely responsible to his Commander for the same.

j. It shall be the responsibility of each Wing Commander to appoint an able Communications Officer for his Wing and to see that each of his subordinate Group Commanders appoint an able Communications Officer for their Groups and so on down the line.

k. A Wing Communications Officer should make it his business either to visit or contact in some satisfactory manner each of his subordinate Communications

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TRAINING DIRECTIVE NO. 21
MAP AND AERIAL PHOTOGRAPH READING

1. General

The purpose of this course is to instruct the student in the fundamentals of map reading, including the conventional signs and symbols used on military maps and map reading in the field, and in aerial photograph reading to sufficient extent to permit reading aerial photographs and aerial mosaics.

2. Text

War Department Basic Field Manual—Elementary Map and Aerial Photograph Reading (FM 21-25)—will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive and Text will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Command and Staff Officers and all Flight Personnel are required to take this course.

5. Instruction Procedure

In addition to required individual study of the text, there will be five instruction periods of one hour each, which will include lectures, field exercises, general discussion, and questions covering this subject.

TRAINING DIRECTIVE NO. 22
AVIATION COMMUNICATIONS

1. General

The purpose of this course is to give Command and Staff Officers and Flight Personnel of the Civil Air Patrol an understanding of the requirements of radio communications for the Patrol and also a knowledge of the requirements of a signal communications system for the Air Forces.

2. Text

The text material presented on the following pages will be supplemented by Air Corps Field Manual (FM 1-45)—Signal Communication—published by the War Department.

3. Distribution

Copies of this Directive and Text will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Command and Staff Officers and all Flight Personnel are required to take this course.

5. Instruction Procedure

In addition to required individual study of the text, there will be eight classroom instruction periods of one hour each which will include lectures, general discussion, and questions covering this subject.

RADIO COMMUNICATION AND DUTIES OF COMMUNICATIONS OFFICERS

1. Purpose

Adequate two-way radio-telephone communication is absolutely necessary to carry out successfully Civil Air Patrol flight missions. Without radio communication the purpose of such missions is essentially defeated before they are started. Therefore, experience has indicated that all such systems of communication must be standardized to such extent that they will function in practically the same manner in all Wings of the Civil Air Patrol. It is recommended that all Communications Officers of each Wing and its subordinate units adopt the following rules and suggestions. Should any changes or additional rules be necessary, the information will be incorporated in bulletins that will be supplied from time to time from National Headquarters. All Civil Air Patrol airplanes must be equipped with adequate two-way radio communication, in order to carry out successfully any assigned mission.

2. Available Frequencies

a. Frequencies for radio use in the Aviation Service have been allotted and set up by the Federal Communications Commission and have been operating satisfactorily for some years. There has been no change in this existing communication system and this headquarters has been informed that it will continue without change at least for the present.

b. 3105 Kc is assigned to itinerant aircraft radio-telephone transmitters. This frequency will be used by all Civil Air Patrol Airplanes under proper license by FCC.

c. The frequency spectrum from 200 to 400 Kc has been assigned to the Civil Aeronautics Administration for use in their extensive communication and radio range system.

d. All pilots are familiar with the above and it is not necessary to go into further details concerning the same.

3. Aircraft Radio-Telephone Transmitters

It is recommended that radio-telephone transmitters installed on Civil Air Patrol planes on 3105 Kc be of at least 10 watts power and that they be constructed according to sound engineering principles. There are numerous sources of supply for transmitters coming under this category and responsibility for obtaining them is left to the individual purchaser. It is not the purpose of the Civil Air Patrol to recommend the products of any manufacturer. The decison must be entirely the purchaser's own. However, if equipment is needed in a hurry for some specific official mission, National Headquarters will attempt to secure a higher priority for the purchaser if in the opinion of the National Commander or Executive Officer such procedure is necessary.

4. Aircraft Radio Receivers

It is recommended that radio receivers installed on Civil Air Patrol planes be constructed according to good engineering principles and that each receiver be capable of receiving on at least the CAA 200 to 400 Kc band. Capability to receive signals on other bands is optional. Responsibility of procuring radio receivers is also that of the individual purchaser in the same manner as indicated under the paragraph "Aircraft Radio Transmitter." FCC License for Radio Receivers are not required.

5. Licensing of Aircraft Transmitters.

a. Formal license application blanks may be secured from the Federal Communications Commission, Washington, D. C., and must be filled out according to the rules contained thereon. In the event immediate use is required for some specific Civil Air Patrol duty, address a telegram direct to the Federal Communications Commission, Washington, D. C., requesting immediate temporary telegraphic authority to use a radio-telephone transmitter of (specified) power on 3105 Kc's, installed on (specified) make of plane. State CAA license number, owner's name and address, that the plane is to be used for Civil Air Patrol duty, and authorize the Federal Communications Commission to send answer **collect.** Permission probably will be granted within twenty-four hours.

b. On the same day the telegram is sent, mail your application and in addition to required information, enclose a copy of your telegram and a letter from your Wing Commander substantiating your request. This will further expedite the issuance of your formal license.

6. Portable Mobile Licenses

It is also possible to secure a Portable Mobile License for a 3105 Kc transmitter which may be used on any one of several different airplanes. On your license application give the CAA License numbers and make of each airplane upon which the transmitter is to be used. The Licensee must also be the actual owner of each of these airplanes.

7. Operators License Requirements

Operators of aircraft radio-telephone transmitters on 3105 Kc must possess a valid FCC Restricted Radio-telephone Operator Permit or higher grade license. (See FCC rules and regulations for information on this.)

8. Responsbility of Communications Officers

a. The Communications Officer of a Wing and subordinate units should be a man of executive ability well qualified to handle any communication problem that should arise for that immediate unit. He should be thoroughly acquainted with the existing aircraft to ground radio communications system, as well as the practical possibilities of this set up for his immediate unit; that is, a knowledge of just how far good reliable two-way communication can be carried on in his vicinity.

b. He should secure an assistant who holds a Commercial Second Class Radiophone License (or higher grade) as well as a radio amateur who holds an Amateur Class "A" Operator License. These men will be of invaluable aid to him in keeping the transmitting equipment on the planes of this unit in good operating condition especially if engaged in an active mission. If he by chance should hold any of these licenses himself, so much the better.

c. He should keep a complete and accurate record of all radio equipment on planes in his unit and also post on his Unit's Operation Bulletin Board the frequency, call identifications, services rendered and magnetic range bearings of all CAA Radio facilities within two hundred miles of his base.

d. He should acquaint himself with the Civilian Defense authorities in his

conducted in an effort to familiarize Pilots and Observers with the terrain over which they might be called upon to execute missions during the fire season. Fire wardens will generally welcome an opportunity to fly on these missions to study routes of access and egress to danger areas and also to instruct the Pilot in this type of work.

TRAINING DIRECTIVE NO. 24
OBSERVATION AND RECONNAISSANCE AVIATION

1. General

The purpose of this course of instruction is to give Command and Staff Officers and Flight Personnel of the Civil Air Patrol an understanding of the tactics and technique involved in air recomnaissance and observation and in the various types of air reconnaissance and observation missions executed in support of air and ground forces.

2. Text

Air Corps Field Manual (FM-1-20)—Tactics and Technique of Air Reconnaissance and Observation—published by the War Department, will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive and Text will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Command and Staff Officers and all Flight Personnel are required to take this course.

5. Instruction Procedure

In addition to required individual study of the text, there will be a series of classroom instruction periods of one hour each which will include lectures, general discussion, and questions covering this subject.

TRAINING DIRECTIVE NO. 25
ADVANCED FLIGHT TRAINING MISSIONS

1. General

This course of instruction is for the advanced training of Pilots and Observers. The missions comprising this course are of such a nature that they should be undertaken only by the more proficient and experienced flight personnel.

2. Text

An outline of Advance Flight Training Missions is presented in the following pages. The Operations Officer will work out the details for each of these missions, making such changes as local terrain, flying restrictions, etc., may necessitate.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters.

Officers, so that he can be sure that each of these men thoroughly understands the duties he is asked to perform as has been outlined herein.

l. It is only by a National standardization of methods of organizing and training CAP personnel that proper co-ordination of communications can be maintained. All facilities are set up and in working order; it is therefore necessary only that we all know exactly how to use them.

TRAINING DIRECTIVE NO. 23
BASIC FLIGHT TRAINING MISSIONS

1. General

Basic Flight Training Missions are intended for the training of Pilot-Observer Teams. Pilots executing these missions should have officially logged a minimum of fifty hours flying time as pilots.

2. Text

An outline of Basic Flight Training Missions is presented in the following pages. The Operations Officer will work out the details for each of these missions, making such changes as local terrain, flying restrictions, etc., may necessitate.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Pilots having at least fifty hours flying time and all Observers are required to take this course unless already thoroughly qualified by past training and experience.

5. Observance of Civil Air Regulations

All flying will be done in accordance with the requirements of the Civil Air Regulations. Permission will be obtained from the Civil Aeronautics Administration for the performance of any missions that may require a waiver.

6. Operations Orders

The Operations Officer will issue an Operations Order for each of these training missions.

7. Report

a. Operations Reports covering each mission will be submitted by the Pilot. In addition, Pilot-Observer Reports will be submitted on all Observation and Reconnaissance Missions.

b. Special emphasis will be placed upon thoroughness and accuracy of observation and upon accuracy and clarity in the preparation of reports.

8. Team-work

Maximum efficiency is obtained from crews whose members are accustomed to working together as a team. Hence, a special effort should be made to have the same Pilot and Observer assigned together on Flight Missions in order to develop team-work.

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CLIP THIS FOR YOUR CAP HANDBOOK
In the September, 1942 issue.

BASIC FLIGHT TRAINING MISSIONS

SUMMARY

1. Patrol Mission (FTM-13)
2. Bombing Practice (FTM-14)
3. Rescue Mission (FTM-15)
4. Dropping Supplies by Parachutes (FTM-16)
5. Highway Traffic Control (FTM-17)
6. Blackout Observance (FTM-18)
7. Training of Anti-Aircraft Personnel (FTM-19)
8. Panel Reading (FTM-20)
9. Radio Communication (FTM-21)
10. Forest Patrol (FTM-22)

DESCRIPTION

1. Patrol Mission (FTM-13)

The purpose of this mission is to simulate the type of work done in flying a border patrol or coast patrol mission. State or county borders or a waterfront may be used. The Pilot-Observer Team will fly along a prescribed section of this border, keeping well to one side of the border while still close enough to keep it under close watch. Distinctive markers should be placed along this line at points unknown to the Pilot and Observer. Description and location of each marker will be given in the Pilot-Observer Report. Such markers may be an automobile in an unusual location, cloth strips, a smudge pot, or anything else out of the ordinary.

2. Bombing Practice (FTM-14)

This mission is designed to develop accuracy in dropping bombs on a target from a plane flying at low altitudes and to develop skill in handling the plane at such altitudes. From an altitude of not less than 200 feet above the ground, one-pound paper bags of flour or similar material will be dropped on a designated target. The Observer will release the bags when the plane is in level flight. Up-, down- and cross-wind approaches will be made. A waiver will be obtained from the Field Inspector of the Civil Aeronautics Administration before carrying out the mission, and special care will be exercised to insure the safety of operations.

3. Rescue Mission (FTM-15)

This mission will be executed by Pilot-Observer Teams in a manner similar to the Rescue Mission (FTM-9) for the primary stage Pilots, but at points considerably farther away from the base airdrome than those used in the primary stage. The supposed scene of the accident should be possibly fifty miles away from the base. The Observer, with the assistance of the Pilot, will prepare a sketch or marked map showing the best route to be followed to the scene of the accident by rescue crews that might be dispatched from the nearest community.

4. Dropping Supplies by Parachutes (FTM-16)

In this mission, objects are dropped by parachute on a target, thus simulating the supplying of isolated areas by such means. The parachutes used will be from three to six feet in diameter and will be dropped both from a minimum altitude of 200 feet and from an altitude of 1,000 feet or higher. Special care will be exercised to prevent fouling of the parachute on the tail surfaces of the airplane.

Waiver must be obtained from the Field Inspector of the Civil Aeronautics Administration before undertaking this mission and all precautions for the safety of operations will be rigidly observed.

5. Highway Traffic Control (FTM-17)

The problem in the Traffic Control Mission is to determine the best means of rerouting highway traffic in the event that a crucial section of a highway is destroyed. The Pilot-Observer Team will be assigned to fly over a vital section of a principal highway which is presumed to have been destroyed. Bridges, intersections with other highways, railroad crossings, etc., may be used as the section which is assumed to be impassable. After arriving at the designated point, the Pilot-Observer Team will prepare a sketch showing the best means of rerouting traffic to bypass the "destroyed" section. In certain defense areas, where critical highway structures are under guard, it will be necessary to obtain permission from the guarding authority before undertaking the mission. In such cases recognition signals with ground troops should be arranged.

6. Blackout Observance (FTM-18)

This mission contemplates co-operation with local defense committees in observing and reporting upon the effectiveness of practice blackouts. Such missions may include observation and reports by Pilot-Observer Teams and the ferrying of local officials for observation purposes.

7. Training of Anti-Aircraft Personnel (FTM-19)

When the commanders of anti-aircraft units so desire, Civil Air Patrol units may co-operate with them by performing "tracking" missions for the training of anti-aircraft personnel. In such missions, a plane is flown at given altitudes over specified courses while the ground personnel practice training their detectors and guns on the plane as a target. Close liaison with the anti-aircraft units is necessary for best results.

8. Panel Reading (FTM-20)

The Panel Reading Mission simulates military missions on which messages are given airmen in flight by means of signal panels laid on the ground. Strips of cloth four feet wide and twelve feet long will be used as panels. They will be laid down singly or in combination to form numerals (1, 2, 3, 4, etc.) or symbols (crosses, squares, triangles, etc.) to each of which a definite meaning will be ascribed in accordance with a prearranged code. For example: A square may mean to return to point of departure, while the numeral 2 may mean that reinforcements are needed. Panel Reading Missions may also include the dropping of messages.

9. Radio Communications (FTM-21)

Flights will be carried out in connection with the course on Aviation Communications. See Training Directive No. 22. Where possible, training will be included in both voice and international code communication and also in orientation by use of loop antenna. Special care will be exercised to observe all FCC and CAA regulations pertaining to radio communications.

10. Forest Patrol (FTM-22)

Forest Patrol Missions should be conducted in co-operation with Federal or State forestry departments. During the off-fire season, practice may well be

in the September, 1942 issue.

CLIP THIS FOR YOUR CAP HANDBOOK

TRIM ON THIS LINE

7. Reports

An Operations Report covering each mission will be submitted by the Pilot. In addition, Pilot-Observer Reports will be submitted on all Observation and Reconnaissance Missions.

8. Instruction Procedure

a. Special emphasis will be placed upon precision flying, thoroughness and accuracy of observation, and accuracy and clarity in the preparation of reports.

b. Maximum efficiency is obtained from crews whose members are accustomed to working together as a team. Hence, a special effort should be made to have the same Pilot and Observer assigned together on Flight Missions in order to develop team-work.

SPECIAL FLIGHT TRAINING MISSIONS

SUMMARY

1. Disaster Mission (FTM-32)
2. Formation Flying—Squadron (FTM-33)
3. Search—Parallel (FTM-34)
4. Search—Radial (FTM-35)
5. Rendezvous—Squadrons in Formation (FTM-36)
6. Instrument Flying (FTM-37)
7. Night Flying (FTM-38)
8. Forest Patrol (FTM-39)
9. Tracking for Searchlight Batteries (FTM-40)

DESCRIPTION

1. Disaster Mission (FTM-32)

The purpose of this mission is to simulate the type of work to be done by a Squadron in case of a major disaster. It will be assumed that roads have been rendered unusable at certain points and that all surface communications in the area have been destroyed. Ground-to-plane communication will be by means of signal panels and plane-to-ground communication will be by message bags with yellow streamers. Emergency relief stations will be simulated at several remote points and patrol cars will be spotted at other locations. Aircraft will be assigned to cover each emergency station on schedule. Each aircraft appearing over its objective will obtain its instructions from the signal panels displayed below and will proceed to comply. This may involve getting certain messages to headquarters, to other emergency stations or to the patrol cars. In the latter case, the planes will direct the patrol cars to the **proper points** over the most direct routes avoiding closed highways. The Pilot-Observer Reports submitted by the several crews at the conclusion of the mission will in each case include all messages, together with the time of receipt and delivery of each.

2. Formation Flying—Squadron (FTM-33)

Pilots who have satisfactorily completed instruction in Formation Flying by Flights (FTM-27) may be given instruction in formation flying involving an entire Squadron. This work should be done under the supervision of a thoroughly experienced instructor.

FOLD ALONG THIS LINE

4. Requirement

Pilots undertaking Advanced Flight Training Missions are required to have officially logged a minimum of 200 hours flying time as pilots. No pilot will be assigned to any of these missions, who, in the opinion of the Unit Commander, is not qualified to perform successfully the particular mission in question. Observers taking this course are required to have completed the courses of instruction covered by Training Directive No. 17—Primary Flight Training Missions and Training Directive No. 23—Basic Flight Training Missions.

5. Observance of Regulations

All flying will be done in accordance with the requirements of (a) the Civil Air Regulations and (b) any special regulations, restrictions, or orders issued by the armed forces or other defense agencies of the Government. Permission will be obtained from the Civil Aeronautics Administration and from such military or other defense agencies as circumstances may necessitate for the performance of any missions that may require a waiver.

6. Operations Orders

The Operations Officer will issue an Operations Order for each of these training missions.

7. Reports

An Operations Report covering each mission will be submitted by the Pilot. In addition, Pilot-Observer Reports will be submitted on all Observation and Reconnaissance Missions.

8. Instruction Procedure

a. Special emphasis will be placed upon precision flying, thoroughness and accuracy of observation and accuracy and clarity in the preparation of reports.

b. Maximum efficiency is obtained from crews whose members are accustomed to working together as a team. Hence, a special effort should be made to have the same Pilot and Observer assigned together on Flight Missions in order to develop team-work.

ADVANCED FLIGHT TRAINING MISSIONS

SUMMARY

1. Pick-up Message Practice (FTM-23)
2. Elementary Formation Flying (FTM-24)
3. Map Reading and Sketching (FTM-25)
4. Dropping Supplies by Parachutes (FTM-26)
5. Formation Flying by Flights (FTM-27)
6. Radio Communications (FTM-28)
7. Rendezvous—Flights in Formation(FTM-29)
8. Night Flying (FTM-30)
9. Instrument Flying (FTM-31)

DESCRIPTION

1. Pick-up Message Practice (FTM-23)

Before undertaking this type of mission it will be necessary to secure two poles, not less than fifteen feet in length with a finishing nail driven in each pole near one end with one-half inch protruding. These poles are to be held by hand in a vertical position approximately thirty feet apart with a message bag tied to light strong line (fish line) long enough to hang over the nail in each pole and on each end of which should be attached a small sack containing approximately one-fourth pound of sand. The special equipment in the plane should consist of 100 feet to 150 feet of heavy cord with a three-prong steel hook about six inches long, attached to one end. The Observer is to pick up the message by use of the hook trailing at least fifty feet below the airplane as the Pilot flies low over the center of the line suspended between the poles. This mission is excellent for the development of precision flying and is a very important military type of mission.

2. Elementary Formation Flying (FTM-24)

Training in formation flying should be conducted under the supervision of experienced pilots and should begin with two-plane elements flying considerable distance apart, then gradually tightening up, then add a third plane to the element. Before attempting formation maneuvers, such as changing from V to echelon, it is suggested that an Army Pilot be requested to explain technique and signals.

3. Map Reading and Sketching (FTM-25)

This mission consists of the dispatch of airplanes with Pilot-Observer crews over designated routes and requiring the Observers to make sketches while en route. These sketches are to show such prominent landmarks as towns, tanks, bridges, highways, railroads, streams, wooded areas, etc. A triangular course, approximately fifteen miles on a leg, starting and terminating at the home airport, is suggested. Observers should make use of military signs and symbols in preparing sketches. Compare the sketches submitted by each Observer flying over the same route and criticize and grade them.

4. Dropping Supplies by Parachutes (FTM-26)

This mission differs from FTM-16 in that it consists of dropping bulky packages at more remote locations and under more difficult weather conditions.

5. Formation Flying by Flights (FTM-27)

Pilots who have satisfactorily completed Elementary Formation Flying (FTM-24) may be formed into flights so that nine planes (three V's of three planes each) may practice formation flying by elements. This work should be done under the supervision of a thoroughly experienced instructor.

6. Radio Communications (FTM-28)

The problems assigned under this heading will be more advanced than those assigned under FTM-21 and will simulate as closely as possible the communications problems encountered in the performance of observation missions for military organizations, such as reporting traffic conditions and movements. The Observer should keep a log of all messages sent and received.

7. Rendezvous—Flights in Formation (FTM-29)

Pilots who have satisfactorily completed FTM-27 may be assigned to rendezvous missions in which flights flying in formation at prescribed altitudes meet at predesignated times over specified points.

8. Night Flying (FTM-30)

It is contemplated that missions assigned under this heading will be such as to give proper training to Pilots needing additional experience in night flying and will include short cross-country flights.

9. Instrument Flying (FTM-31)

Pilots not holding instrument ratings should be encouraged to take instrument flight training so far as practicable for them to do so.

TRAINING DIRECTIVE NO. 26
SPECIAL FLIGHT TRAINING MISSIONS

1. General

This course of instruction is intended to round out the advanced training of Pilots and Observers. The missions comprising this course are of such a nature that they should be undertaken only by the more proficient and experienced flying personnel. These missions may be carried on concurrently with the Advanced Flight Training Missions covered by Training Directive No. 25 or may be undertaken after the latter have been completed, as circumstances may dictate.

2. Text

An outline of Special Flight Training Missions is presented in the following pages. The Operations Officer will work out the details for each of these missions, making such changes as local terrain, flying restrictions, etc., may necessitate.

3. Distribution

Copies of this Directive will be distributed on the basis of four copies per Headquarters.

4. Requirement

Pilots undertaking Special Flight Training Missions are required to have officially logged a minimum of 200 hours flying time as pilots. No Pilot will be assigned to any of these missions, who, in the opinion of the Unit Commander, is not qualified to perform successfully the particular mission in question. Observers taking this course are required to have completed the courses of instruction covered by Training Directive No. 17—Primary Flight Training Missions, and Training Directive No. 23—Basic Flight Training Missions.

5. Observance of Regulations

All flying will be done in accordance with the requirements of (a) the Civil Air Regulations and (b) any special regulations, restrictions, or orders issued by the armed forces or other defense agencies of the Government. Permission will be obtained from the Civil Aeronautics Administration and from such military or other defense agencies as circumstances may necessitate for the performance of any missions that may require a waiver.

6. Operations Orders

The Operations Officer will issue an Operations Order for each of these training missions.

O. D. NO. 4. AIR DISCIPLINE

We are at war. The Civil Air Regulations have been modified to meet the requirements of the Army and Navy in providing for the National Defense. It is imperative that all pilots observe these regulations to the letter.

There are certain areas over which no flying is permitted. These areas have anti-aircraft defenses which are under orders to shoot down any aircraft passing over them. Civil Air Patrol pilots are hereby directed to familiarize themselves with areas and routes over which their particular flights are to be made and conduct their flying accordingly. It is important that all pilots navigate accurately and adhere rigidly to their flight plans.

This is no time for foolish flying. The fact that the Civil Air Patrol insignia is displayed on a plane or that the plane is engaged in an official mission does not give the pilot permission to break the Civil Air Regulations or do unnecessary aerobatics. On surveillance and search missions, for example, the Operations Orders governing the missions are not a permit for hedge-hopping.

Certain missions, including pick-up message training, will require low flying. Such flying should be cleared with Civil Aeronautics Administration inspectors and airport managers.

Failure of Civil Air Patrol flight personnel to comply with regulations will not be tolerated. Unit Commanders are hereby directed to take prompt disciplinary action against any such personnel under their command who break regulations or engage in careless flying.

Without thorough air discipline, the Civil Air Patrol is of no value as a flying auxiliary to the armed forces. Develop air discipline.

O. D. NO. 5. OPERATIONS ORDERS FOR FLIGHT MISSIONS

All flight missions undertaken as part of Civil Air Patrol activity will be authorized by Operations Orders. Training Directive No. 15 currently sets forth the procedure.

Neither protection under the master insurance policies covering Civil Air Patrol operations, nor official credit toward Civil Air Patrol training requirements, nor available reimbursement of expenses will be given any person directly involved in a flight not authorized by an Operations Order. Such persons include the pilot, crew members, passengers and plane owner.

Operations Orders will be issued only for flight missions to be carried out as a bona fide Civil Air Patrol activity and only in accordance with Civil Air Patrol procedure.

O. D. NO. 6. TABLE OF ORGANIZATION FOR CIVIL AIR PATROL

Wing and Group Headquarters and Squadrons will be organized in accordance with the Civil Air Patrol Table of Organization (T/O). This table establishes relative rank and grade of personnel and the maximum strength in each category. Units may operate at a strength below the maximum, but will not exceed it.

It must be remembered that it is not rank but constituted authority which

3. Search—Parallel (FTM-34)

An easily identified object, such as two strips of cloth placed on the ground in the form of the letter T to simulate an airplane, will be placed at some out-of-the-way point in the area over which the search is to be made. The area will be covered by several planes operating over a series of prearranged parallel flight lines so placed as to insure thorough coverage of the entire area. In performing a mission of this kind the primary responsibility of the Pilot is to avoid collision with other aircraft and follow his assigned flight lines. The duty of the Observer is to search for the lost object, check position of the aircraft on the map at regular frequent intervals, and, having found the object, mark its exact position on the map and determine the best route over which to reach it on the ground.

4. Search—Radial (FTM-35)

In this mission the search object may be reported as being in an area centering around some certain point. The area to be searched is indicated on a map and is divided into segments by a series of radial lines emanating from the center point. Each plane participating in the mission is assigned to cover one or more specified segments, beginning in each case at the center point and widening the search as the distance out increases. The responsibilities of Pilot and Observer in the performance of this mission are the same as those prescribed for FTM-34.

5. Rendezvous—Squadrons in Formation (FTM-36)

Pilots who have satisfactorily completed FTM-33 may be assigned to rendezvous missions in which Squadrons flying in formation at prescribed altitudes meet at pre-designated times over specified points.

6. Instrument Flying (FTM-37)

Proficiency in instrument flying is necessary for successful military operations. Pilots should be encouraged to improve their instrument technique. Overcast conditions permit of excellent training on a safe basis.

7. Night Flying (FTM-38)

Missions assigned under this heading will be such as to round out the experience of Pilots and Observers in cross-country night navigation.

8. Forest Patrol (FTM-39)

It is intended that these missions furnish advanced training for assignments of the forest patrol type and that they be executed during periods of poor visibility requiring Pilots to fly on instruments part of the time, thus simulating a condition where smoke from a forest fire might necessitate such flying. Missions of this type afford opportunity for training Observers in navigation and terrain familiarization.

9. Tracking for Searchlight Batteries (FTM-40)

When the commanders of searchlight units so desire, Civil Air Patrol units may co-operate with them by performing "tracking" missions for the training of personnel. In such missions airplanes are flown at given altitudes over specified courses while the ground personnel practice training searchlights on the planes. Close liaison with the searchlight units is necessary for best results. Pilots assigned to these missons should be experienced in instrument flying as they will be blinded by the searchlights. Before undertaking such missions, an easily-recognized distress signal should be agreed upon which the Pilots can give in case of emergency requiring immediate extinguishing of the lights.

TRAINING DIRECTIVE NO. 27
AIRPLANE INSPECTION

1. General

This course of instruction is for the purpose of informing airplane and engine mechanics, mechanics' helpers, and other maintenance personnel of the Civil Air Patrol relative to the inspection of airplanes, airplane engines, and auxiliary equipment as practiced by the Army Air Forces.

2. Text

War Department Technical Manual—Airplane Inspection Guide (TM 1-415) will be used as the text for instruction in this subject.

3. Distribution

Copies of this Directive and the Text will be distributed on the basis of four copies per Headquarters.

4. Requirement

All Civil Air Patrol members assigned to the maintenance of airplanes, airplane engines and auxiliary equipment are required to take this course.

5. Instruction Procedure

In addtion to to required individual study of the text, there will be at least six classroom instruction periods of one hour each which will include lectures, practical demonstrations, general discussion, and questions covering this subject.

O. D. NO. 1. STANDARD NUMBERING FOR CIVIL AIR PATROL UNITS

Each Wing will be designated by a two-figure number. The first figure will be the number of the Region (Corps Area) in which the Wing is located. The second figure will be the serial number which has been assigned to the corresponding State within the Region. Thus, the Wing in the State of Maine will be Wing No. 11, while the Wing in the State of Texas will be Wing No. 81.

The Groups will be numbered serially in each Wing, beginning in each case with No. 1, and will be designated by a three or four-figure number made up of the number of the Wing followed by this serial number. Thus, the Fourth Group in the Maine State Wing will be Group No. 114, while the Tenth Group in the State of Texas will be Group No. 8110.

The Squadrons will be numbered serially in each Group, beginning in each case with No. 1, and will be designated by a number consisting of the Group number, a hyphen and the serial number. Thus, the Second Squadron of the Fourth Group in the Maine State Wing will be Squadron No. 114-2.

The Flight number will be the Squadron number followed by the letter designating the Flight. The Headquarters Flight in Squadron No. 114-2 will be Flight No. 114-2H and Flight A, in this same Squadron, will be Flight No. 114-2A.

O. D. NO. 2. DISPLAY OF CIVIL AIR PATROL INSIGNIA ON AIRCRAFT

The Civil Air Patrol insignia (blue disk with superimposed white triangle and with red three-blade propeller superimposed on triangle) shall be placed on the wings and fuselage of all aircraft engaged in official Civil Air Patrol missions. Any aircraft while displaying such insignia shall be flown exclusively by members of the Civil Air Patrol.

Insignia disks placed on wings shall be centered on the top side of the left wing and on the bottom side of the right wing at a point one-third of the distance from the wing tip to the fuselage. The diameter of said disks shall not exceed two-thirds of the wing chord at the point of application.

Insignia disks placed on the fuselage shall be centered on both sides of the fuselage at a point one-third of the distance from the leading edge of the horizontal stabilizer to the trailing edge of the wing. The diameter of said disks shall not exceed two-thirds of the depth of the fuselage at the point of application.

This memorandum is in no way to be construed as requiring the display of Civil Air Patrol insignia on aircraft engaged in Civil Air Patrol training activities, nor of limiting participation in such training activities to aircraft displaying said insignia, nor of preventing aircraft displaying such insignia from being used in non-official flying provided the pilot is a member of the Civil Air Patrol.

O. D. NO. 3. WEATHER INFORMATION FOR CIVIL AIR PATROL

On January 30, 1942, the Weather Bureau distributed Circular Letter No. 12-42 to all Weather Stations from which we quote the following excerpt: " . . . Civil Air Patrol pilots and officers . . . are to be given weather information on the same basis as air line personnel."

It is emphasized that under war conditions weather information is classified military information, i. e., information which shall not be disclosed except to authorized persons. Military regulations affecting military personnel and the Espionage Act affecting civilians provide heavy penalties in time of war for those who unlawfully disclose or attempt to disclose military information.

It is hereby directed that members of the Civil Air Patrol keep confidential all weather information received under the authority set forth in Circular Letter 12-42 mentioned above or under subsequent authorization. This means that such information shall be disclosed only to authorized persons who require it in the performance of official duties.

Each unit will make its own local arrangements for obtaining weather information, complying with such identification routine as may best suit the requirements of local Civil Aeronautics Administration offices or Weather Bureau stations.

In the event that a unit of the Civil Air Patrol supplies a list of its pilots to such a local office or station, notation will be made at the top of the list reading: "This list not official after (Date)." No list will be effective for more than thirty days. Should any person named in such list cease to be a member of the unit, his name shall be stricken from the list at once.

Some weather offices require a call-back on the telephone to verify identification. If there is a toll charge the pilot shall accept it collect, as the Weather Bureau has no funds for such purposes.

(1) Shall have officially logged a minimum of 400 hours as a pilot, of which at least 150 hours shall have been cross-country, and at least 30 hours shall have been night flying.

(2) Shall hold an effective Instrument Rating issued by the Civil Aeronautics Administration.

(3) Shall hold an effective Federal Communications Commission Restricted Radio-telephone Operator Permit.

(4) Shall be able to send and receive six (6) words per minute in International Morse Code.

(5) Shall have completed Civil Air Patrol Basic Training Courses and Specialized Training Courses for Pilots and Observers covered by Training Directives No. 1 to 26, inclusive (TM-7 and TM-13).

d. **Master Pilot Officer:** Any Civil Air Patrol member holding an effective Civil Aeronautics Administration Airman Certificate of the grade of Private Pilot, or higher, and possessing the following qualifications:

(1) Shall have officially logged a minimum of 1,000 hours as a pilot, of which at least 250 hours shall have been on aircraft powered with not less than 400 h.p., at least 500 hours shall have been on cross-country flying; and at least 40 hours shall have been night flying.

(2) Shall hold an effective Instrument Rating issued by the Civil Aeronautics Administration and shall have officially logged at least 50 hours on Instrument Flying.

(3) Shall hold an effective Federal Communications Commission Restricted Radio-telephone Operator Permit.

(4) Shall be able to send and receive ten (10) words per minute in International Morse Code.

(5) Shall have completed Civil Air Patrol Basic Training Courses and Specialized Training Courses for Pilots and Observers covered by Training Directives No. 1 to 26, inclusive (TM-7 and TM-13).

e. **Observer:** Any Civil Air Patrol member who has officially logged a minimum of 15 hours in the air on Observer Training Missions or a minimum of 15 hours in the air as a student pilot.

f. **Observer Officer:** Any Civil Air Patrol member possessing the following qualifications:

(1) Shall have officially logged a minimum of 30 hours on Air Missions as Observer, including satisfactory completion of at least 12 of the Observer Missions covered by Civil Air Patrol Flight Training Directives No. 17, 23, 25 and 26.

(2) Shall have completed Civil Air Patrol Basic Training Courses covered by Training Directives No. 1 to 12, inclusive (TM-7).

(3) Shall hold an effective Federal Communications Commission Restricted Radio-telephone Operator Permit.

(4) Shall be able to send and receive six (6) words per minute in International Morse Code.

commands obedience. Thus, a Wing Staff Operations Officer by virtue of the authority of his position and as representative of his Commander may, in line of duty, give orders to a Group Commander.

Duties of the Wing, Group and Squadron Officers are discussed in Training Directive No. 20. Duties of Command and Staff Officers. Officers may be assigned to more than one duty. For example, the Engineering Officer, if qualified, may also be one of the pilots assigned to a flight.

The organization of Sections within the Squadron is shown in the vertical columns of the Organization Table. Each Section Staff Officer will be responsible for seeing that all personnel assigned to his Section are fully informed as to their duties within the Section.

In accordance with war regulations, at the present time cameras will not be taken aloft in aircraft. As the Civil Air Patrol proves its military value, it may be called upon to perform certain photographic missions. Hence, provision has been made for the organization of Photographic Sections in Civil Air Patrol Squadrons.

O. D. NO. 7. RULES OF LAND WARFARE

It is imperative that members of the Civil Air Patrol be thoroughly familiar with certain fundamentals of the Rules of Land Warfare and that Civil Air Patrol operations be conducted in accordance with these Rules. To this end, Unit Commanders will regularly bring to the attention of all members of the Civil Air Patrol the Rules of Land Warfare. The extracts from the Rules of Land Warfare presented herewith will be read to all enrollees when the oath of office is given. Unit Adjutants will occasionally call attention to these Rules at drill formations.

As a Volunteer Corps serving as an auxiliary to the Armed Forces, the members and units of the Civil Air Patrol will observe the following rules:

a. Obey their officers.

b. Wear the Civil Air Patrol shoulder patch sewn on their clothing.

c. Carry openly such arms as may be required.

d. Conduct operations according to laws and usages of war.

Should a Civil Air Patrol member be captured by an enemy, the enemy Intelligence Officer would probably ask many questions in an attempt to learn as much as possible about our Army and Navy. Under the Rules of Land Warfare, it is not necessary to answer these questions. Prisoners of war under these Rules are required to give only the following information to the enemy: "Name, grade and serial number".

Due to the importance of this Directive, its contents will be impressed upon members of the Civil Air Patrol by frequent reiteration.

TEXT: Extracts From Rules of Land Warfare
(War Department Basic Field Manual FM 27-10)

1. The Rules of Land Warfare are based on various treaties which the United States has entered into with other nations of the world. As early as 1864, Red Cross conventions were held. The Hague Convention, first held in 1899, relates to the laws and customs of war on land. Such subjects as the treatment

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of prisoners of war, their parole, the rights of citizens in occupied countries, and the prohibition of the use of certain types of weapons were set forth in treaties to which the United States and other nations became signatories. There are also unwritten rules of laws of war.

2. When an enemy occupies a hostile country, the population is divided into two general classes, known as the **armed forces** and the **peaceful population.** Both classes have distinct rights, duties and disabilities. **No person can belong to both classes at one and the same time.**

3. It is important that lawful belligerents observe the Rules of Land Warfare so that when captured they will be treated as prisoners of war.

4. Lawful belligerents are composed of armies, militia, and volunteer corps. The laws, rights and duties of war apply not only to armies, but also to militia and volunteer corps fulfilling the following conditions:

a. To be commanded by a person responsible for his subordinates.

b. To have a fixed distinctive emblem recognizable at a distance.

c. To carry arms openly.

d. To conduct their operations in accordance with the laws and usages of war.

In countries where militia or volunteer corps constitute the army, or form part of it, they are included under the denomination "army".

Combatants and noncombatants: The armed forces of the belligerent parties may consist of combatants and noncombatants. In the case of capture by the enemy, both have a right to be treated as prisoners of war.

O. D. NO. 8. CERTIFICATES OF WAIVER FROM CIVIL AERONAUTICS ADMINISTRATION FOR TRAINING FLIGHTS

The General Inspection Division of the Civil Aeronautics Administration in Washington has been advised that some Civil Air Patrol flight training missions will necessitate a waiver of certain Civil Air Regulations. These include drop and pick-up message missions, and bombing practice, and dropping of supplies by parachute.

Each Squadron will make application to the nearest Civil Aeronautics Inspector on the regular CAA waiver form asking for permission to perform these training flights. In some instances, these missions cannot be flown on the local airport. In such cases, the application for waiver will clearly indicate the site where it is proposed to conduct the operations. Selection of such sites will be made on a basis of maximum safety. For example, when a motor is throttled back for message pick-up, it may load up and fail to take full throttle for the zoom. Therefore, the field should be amply large for forced landing.

The General Inspection Division of CAA has advised that Field Inspectors will issue waivers for such exceptions to regulations when conducted as a part of Civil Air Patrol training.

Pilots will not be permitted to fly missions requiring waivers at random, but only during specified training periods and as authorized by the waiver.

O. D. NO. 9. SQUADRON OPERATIONS RECORDS

The Squadron Operations Officer will keep complete records on the following:

a. All Flying operations.

b. Status of training of flight crews.

c. Number and types of airplanes available and the equipment installed on each.

Such information will be needed for periodic reports. The file of Squadron Operations Orders, together with the records of flying time (squadron operations board, log books, and operations reports) will enable the Squadron Operations Officer to compile a monthly summary of the number of hours flown by the Squadron on various types of operations and missions.

When reconnaissance missions are flown, a Pilot-Observer Report will be made out by the observer and countersigned by the pilot. Except when specifically ordered, such reports will not contain information regarding movements or installations of friendly military troops or naval units or their location. When such information is officially ordered, extreme care will be exercised by all concerned to see that it is properly safeguarded and that it is not permitted to fall into unauthorized hands. Pilot-Observer Reports are ordinarily filed with the Intelligence Officer.

When so directed by proper authority, pilots will make out Operations Reports covering flight missions.

Training Mission Reports need not be retained in the files unless so directed by proper authority.

O. D. NO. 10. AERONAUTICAL RATINGS FOR CIVIL AIR PATROL FLYING PERSONNEL

1. **Ratings and Required Qualifications:**

Aeronautical ratings for Civil Air Patrol pilots and observers and the qualifications required therefor are hereby announced.

a. **Pilots:** Any Civil Air Patrol member holding an effective Civil Aeronautics Administration Airman Certificate of the grade of Private Pilot, or higher.

b. **Pilot Officer:** Any Civil Air Patrol member holding an effective Civil Aeronautics Administration Airman Certificate of the grade of Private Pilot, or higher, and possessing the following qualifications:

(1) Shall have officially logged a minimum of 200 hours as a pilot, of which at least 75 hours shall have been cross-country, and shall have made at least 15 night landings.

(2) Shall hold an effective Federal Communications Commission Restricted Radio-telephone Operator Permit.

(3) Shall have completed Civil Air Patrol Basic Training Courses covered by Training Directives No. 1 to 12, inclusive (TM-7).

c. **Senior Pilot Officer:** Any Civil Air Patrol member holding an effective Civil Aeronautics Administration Airman Certificate of the grade of Private Pilot, or higher, and possessing the following qualifications:

*The figures presented in the Accident Insurance column of the foregoing schedule represent the hourly premium charge for accident insurance for Civil Air Patrol pilot only. In case the pilot carries with him an observer and/or passengers, excepting members of the Armed Services of the United States on active duty, add $0.125 to the hourly accident insurance premium charge for each such additional occupant of the airplane and make a corresponding increase in the total hourly rate.

†Except in cases of emergency, courier missions and miscellaneous services will be limited to airplanes of less than ninety horsepower, unless otherwise specifically authorized in writing by National Headquarters.

4. The following insurance is required on all aircraft engaged in operations covered by these schedules and no aircraft will engage in said operations until such insurance is first secured in the manner set forth in insurance instructions issued by Civil Air Patrol in the following General Memoranda:

GM-23 Subject: Liability Insurance

GM-24 Subject: Crash Insurance

GM-25 Subject: Accident Insurance

(NOTE: Crash and Accident Insurance are not automatically available on missions performed for war industries and special arrangements shall be made with the insurance underwriters to secure such coverage.)

(a) The crash insurance premium on each aircraft used in said operations will be paid from the aircraft total allowances set forth in paragraph 3 hereof. The hourly premium charge for this insurance for aircraft of various horsepower is listed in the schedule presented in paragraph 3.

(b) The premium for accident insurance on all occupants of planes participating in said operations will be paid from the aircraft allowances herein set forth in paragraph 3. Accident insurance for passengers carried under operations orders, excepting members of the Armed Services of the United States on active duty, will be secured in the manner outlined in GM-25 whether or not such passengers are Civil Air Patrol members. The premium charge for this insurance in these types of operations is 12½c per flying hour per person. If the particular service to be performed requires that a Civil Air Patrol pilot be the only occupant of the plane, the premium charge for accident insurance (which will be included in the total aircraft allowance) will be 12½c per hour. If a particular service requires that additional persons occupy the airplane, excepting members of the Armed Services of the United States on active duty, the premium charge for accident insurance (which will be included in the total aircraft allowance) will be correspondingly increased.

(c) The public liability insurance premium on each aircraft used in said operations will be paid from the aircraft total allowances set forth in paragraph 3 hereof. The hourly premium charge for this insurance for aircraft of various horsepower is listed in the schedule presented in paragraph 3.

5. Cases of emergency which, in the opinion of the Civil Air Patrol officer in charge, call for a departure from the regular procedure set forth in this Operations Directive, will in each case be covered by a written report to National Headquarters setting forth in detail (a) the factors justifying such emergency action and (b) the mission performed.

(5) Shall possess Physical Fitness Certificate equivalent to Private Pilot standards of the Civil Aeronautics Administration.

(NOTE: Pilot time will be credited on the foregoing total time in the air, but prescribed missions shall be performed on duty as Observer).

g. **Senior Observer Officer:** Any Civil Air Patrol member possessing the following qualifications:

(1) Shall have officially logged a minimum of 50 hours on Air Missions as Observer, including satisfactory completion of at least 24 of the Observer Missions covered by Civil Air Patrol Flight Training Directives No. 17, 23, 25 and 26.

(2) Shall have completed Civil Air Patrol Basic Training Courses and Specialized Training Courses for Pilots and Observers covered by Training Directives No. 1 to 26, inclusive (TM-7 and TM-13).

(3) Shall hold an effective Federal Communications Commission Restricted Radio-telephone Operator Permit.

(4) Shall be able to send and receive ten (10) words per minute in International Morse Code.

(5) Shall possess Physical Fitness Certificate equivalent to Private Pilot standards of the Civil Aeronautics Administration.

(NOTE: Pilot time will be credited on the foregoing total time in the air, but prescribed missions shall be performed on duty as Observer.)

2. **Applications for Aeronautical Ratings:**

All applications for Aeronautical Ratings will contain sufficient evidence to show that the applicants are qualified for the ratings requested and will be prepared in duplicate. Said applications will be filed with the commanders of the units to which the applicants are assigned, who will examine log books and other certified records of the applicants and will carefully check and verify all evidence presented. After such verification, applications will be forwarded with appropriate endorsements and recommendations through channels to Wing Headquarters for review and recommendations by Examining Boards appointed by the Wing Commanders.

3. **Examining Boards:**

Each Wing Examining Board will consist of three (3) Pilot Officers, one of whom shall be a Senior Pilot Officer, or equivalent, who shall act as Chairman. The junior member of the Board will act as Secretary and will keep a record of the actions of the Board. The Board will review all applications and the endorsements and recommendations appended thereto by Group and Squadron Commanders and will prepare recommendations as to action to be taken. The original copy of the application together with the original copy of the recommendations of the Board will be directed to the Wing Commander, the duplicate copies of these documents being retained in the files of the Secretary of the Board.

4. **Issuance of Ratings:**

Wing Commanders will review the recommendations of their respective Boards, returning to Squadron Headquarters through channels any applications which may be disapproved. Applications approved for the ratings of "Pilot" and

"Observer" will be retained by the Wing Commander who will issue Personnel Orders announcing each member of his Command who is so rated. Applications approved for the several Pilot Officer and Observer Officer ratings will be forwarded by Wing Commanders to the National Headquarters. These applications will be reviewed and appropriate ratings will be granted by the National Commander. Said ratings will be announced by Personnel Orders issued by National Headquarters.

5. **Dual Ratings:**

Applicants meeting the prescribed requirements may be rated in both the Pilot and the Observer classes.

O. D. NO. 11. ORGANIZATION OF SQUADRONS

The maximum authorized aggregate strength for Civil Air Patrol Squadrons is 200. The minimum strength is fifty. Squadrons having less than fifty are to be reorganized as Flights and attached to the nearest Squadron in their respective wings.

All enrollments will be limited to Pilots, Observers, Mechanics, Radio Operators, Radio Mechanics, and Parachute Riggers except when, in the opinion of the Unit Commander, the enrollment of other specialists is necessary to meet operating requirements.

O. D. NO. 12. MASS MOVEMENTS OF AIRPLANES

Unless specifically ordered by Theatre Commanders or by the National Commander, Civil Air Patrol, there will be no mass movements of CAP airplanes to points which have been designated as Theatres of Operations.

Requests for clearance for the above mass movements will be filed only after such movements have been specifically ordered.

O. D. NO. 13. REIMBURSEMENT SCHEDULES FOR CAP COASTAL PATROLS

The contents of this directive are restricted to CAP Coastal Patrols.

O. D. NO. 14. INFANTRY DRILL

All Squadrons will devote at least one (1) hour per month to Infantry Drill, including Roll Call, Inspections and Reviews. The importance of such exercises from the standpoint of developing precision of action, general efficiency and esprit de corps cannot be emphasized too strongly.

O. D. NO. 15. ADMINISTRATIVE PROCEDURE FOR CAP COASTAL PATROLS

The contents of this directive are restricted to CAP Coastal Patrols.

O. D. NO. 16A. REIMBURSEMENT SCHEDULES FOR COURIER MISSIONS AND MISCELLANEOUS SERVICES

1. **General.**

1. (a) The reimbursement schedules announced in this directive apply to all Civil Air Patrol operations involving Courier Missions and Miscellaneous Services performed at the request of, and with funds furnished by, any federal or state government of the United States, or any subdivision, unit, department or agency thereof, by the American Red Cross, or by any war industry. These schedules do not apply to operations involving Coastal Patrol, Forest Patrol, Pipe Line Patrol, Border Patrol, or Target-Towing Service.

(b) With the exception of requests filed with National Headquarters by agencies of the Federal Government, all requests for such Courier Missions and Miscellaneous Services and all arrangements incident thereto will in each case be cleared with Wing Headquarters. Except in cases of emergency, details of proposed missions will be submitted to National Headquarters and missions will not be undertaken until National Headquarters has issued a general authorization order.

(c) Except in cases of emergency, complete arrangements as to procedure to be followed in making reimbursement for services performed under the schedules announced herein will be worked out with the requesting agency before said missions are undertaken.

(d) All such missions will in each case be covered by official Operations Orders in accordance with the provisions of Operations Directive No. 5, Operations Orders for Flight Missions, March 6, 1942.

(e) Daily Operations Reports on forms which will be furnished by National Headquarters will be submitted to National Headquarters **in duplicate.** Such reports will be signed by the Civil Air Patrol officer in charge of the missions and will set forth the required information for each day of operation. In the column headed "Pilot", there will be included not only the name of the Pilot, but the name of the Observer and any passengers carried on each flight.

2. The following Per Diem Schedule will apply to such personnel as are authorized in general Authorization Orders issued by National Headquarters:

Operations Officer	$8.00
Assistant Operations Officer	8.00
Pilots	8.00
Observers	7.00
Clerk Typists	5.00

3. The following Hourly Rates will be paid for the use of aircraft:

H. P. Range	Operation and Maintenance	Depreciation	Crash Insurance	*Accident Insurance	Public Liability Insurance	Total
50-60	$ 2.50	$ 2.00	$0.375	$0.125	$0.10	$ 5.10
65-75	2.70	2.50	0.50	0.125	0.10	5.925
80-120†	4.40	3.50	1.125	0.125	0.10	9.25
125-165	6.40	5.00	1.375	0.125	0.10	13.00
175-200	7.40	5.00	1.625	0.125	0.10	14.25
225-245	9.40	5.00	2.00	0.125	0.10	16.625
250-295	10.60	6.25	2.50	0.125	0.10	19.575
300-345	12.50	7.50	3.75	0.125	0.10	23.975
350-395	15.30	8.75	4.50	0.125	0.10	28.775
400-445	20.00	10.00	5.25	0.125	0.10	35.475

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